



# Iran Nanotechnology Products

February 2019

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# **Iran Nanotechnology Products**

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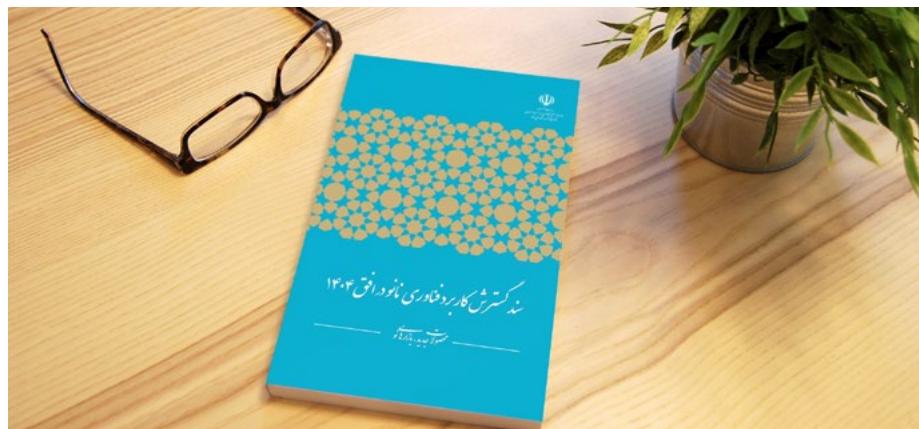


Iran Nanotechnology Innovation Council (INIC) has begun its activities in 2003, aiming for the development of nanotechnology, which in turn opens the doors to the development of various technologies and products. In this regard, INIC, undertaking the establishment of long-term frameworks for the development of nanotechnology in Iran, devised the first ten-year strategic plan for nanotechnology which was approved by the government of Iran in 2005.

During the first decade of its activity, INIC took major steps in pursuit of its aim, in so far as a model of the purposeful scientific movement planned for the development of nanotechnology was presented by this council. The document of extending the application of nanotechnology by 2025 was prepared based on the assessments of and feedback received from implementing the first ten-year document, in accordance with new approaches and the latest policies on the advancement of science and technology. In this document, the objectives and procedures for accomplishing them have been updated in such a way that the leading place of the country in the development of this emerging technology is held stronger than ever.

According to the vision of this document, the advancement of nanotechnology in Islamic Republic of Iran is to promote the welfare of all citizens, owing to its positive influence on the country's development and wealth creation by 2025. The following are three macro goals of the second ten-year strategic plan for the development of nanotechnology in the country:

- Increasing the positive effects of nanotechnology on the improvements in living standards;
- Reaching a suitable place among the countries actively involved in nanoscience and nanotechnology;
- Acquiring an appropriate share of the global nanotechnology market.



#### A Book on the Nanotechnology Products of Iran

The nanotechnology-related activities in Iran have so far led to the fabrication of a variety of products in the different fields of nanotechnology, whose information has been collected in a book; its first volume has been dedicated to nanotechnology-based products on the market while the second one to the equipment somehow operating by means of nanotechnology, all of which have been awarded the Nanoscale Certificate of INIC.

### Nanotechnology Products Evaluation Unit in Iran (NanoMeghyas)

The Evaluation Unit of Nanotechnology Products in Iran was established under the auspicious of INIC in 2007, aimed at providing market transparency, improving consumer confidence, and enhancing the quality of nanotechnology products. This unit, being mainly in charge of characterizing the properties of the products, corroborating them as being truly nanoscale, and issuing them with the Nanoscale Certificate, offers services in many places from the Technology to market service corridor. Up to this point, more than 1,400 applications were processed, and 504 products were granted the Nanoscale Certificate in this unit.

### Product Acceptance Criteria

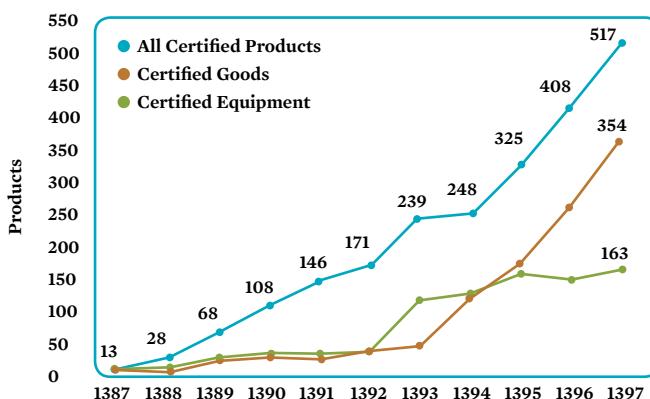
Based on the International Standard of ISO/TS 18110:2015, "Nanotechnologies – Vocabularies for science, technology and innovation indicators", and National Standard of ISIRI 12098, "Nanotechnology – Vocabulary and Main Definition", the term "nanotechnology product" refers to a product that simultaneously satisfies the following three conditions:

- The product is designed based on the nanotechnology and scientific knowledge of nanoscale (1-100 nm);
- The function or feature of the product is enhanced using nanotechnology;
- The product is manufactured by means of an engineering process.

It is worth mentioning that the products that comply with the International Standard of ISO/TS 18110:2015 and National Standard of ISIRI 12098 are issued with the Nanoscale Certificate after being evaluated and characterized by the related analyses. This one-year certificate, able to be extended for another three years by the end of the first year, necessitates the regular inspections of the company to ensure that the product is fabricated in conformity with the standards during the entire validity period of the certificate.

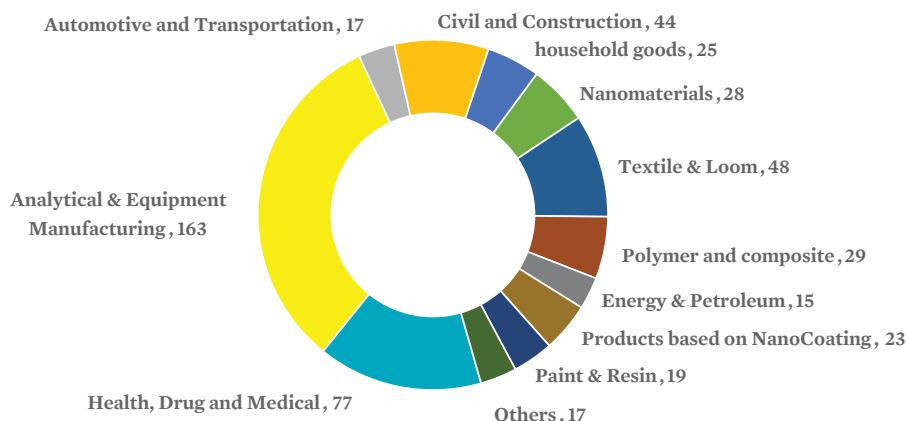
The technologies and products that only fulfill the technical requirements contained in the regulations of the institute while not meeting the manufacturing and commercial requirements, such as holding production and operation license or other necessary licenses, active quality control unit, etc., are eligible for receiving the Trial Nanoscale Certificate.

### Statistics for Nanotechnology Products and Equipment (up to January 2019)

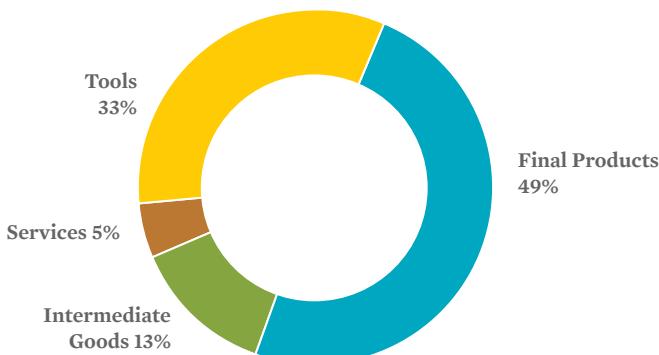


The following table indicates statistics for the nanotechnology products of Iran, which have received the Nanoscale Certificate until January 2019.

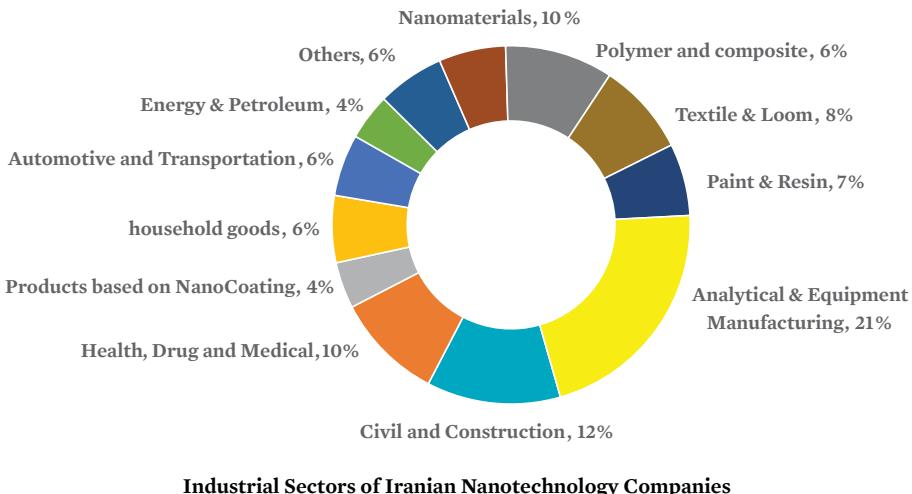
Companies		Products	
157	Goods Manufacturer	354	Certified Goods
46	Equipment Manufacturer Total	163	Certified Equipments
203	Total	517	Total



**The Classification of the Products Holding the Nanoscale Certificate**



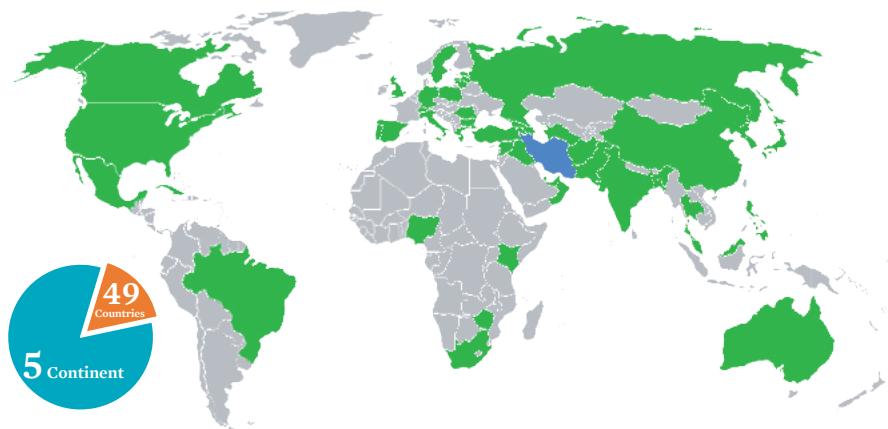
**The Classification of the Nanoscale Products based on ISO18110**



### **The Exports of Nanotechnology Products**

The expansion of the export programs of INIC in recent years has laid the groundwork for Iranian nanotechnology products, equipment, and services to find their way into global markets, in so far as the value of Iran's nanotechnology exports in 2018 showed an increase of approximately 80% compared to the previous year and reached to total 62.5 million dollars.

### **Iran Nano Export Map**







# Medicine

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- Anti-cancer Drug (SinaDoxosome)
- Cancer Treatment Drug (Paclinab)
- Sina Curcumin Capsule
- Cutaneous Leishmaniasis Treatment Topical Gel (Sina Ampholish)
- Antibacterial gauze (Agicoat)
- Wound Disinfectant Spray
- Biomolecule Detection Kit
- Pregnancy Rapid Test Kit
- Rapid Test Kit Family



# Anti-cancer Drug (SinaDoxosome)



## Introduction

This product is SinaDoxosome containing liposomal hydrochloride doxorubicin. Its formulation is in a way that inserts doxorubicin into the nanoliposome carriers and increases permeability and retention of the drug in the tumor tissue. This lipid carrier decreases the side effects of doxorubicin due to the small amount of leakage. In this way cardiac toxicity of the drug that is the most dangerous side effect is significantly reduced. SinaDoxosome is used in the treatment of various cancers and because of the high efficiency of its liposomal nature, it has significant effect on metastatic cancers including metastatic breast, ovarian cancers as well as multiple myeloma and AIDS-related Kaposi's sarcoma.



## Application

- >Mainly for destroying cancer cells, reducing size and postponing tumor growth in diseases including metastatic breast cancer, advanced ovarian cancer, Multiple myeloma, and AIDS-related Kaposi's sarcoma.



### Advantage of Using Nanotechnology

Nanoliposomes are the most widely used drug delivery vehicles which increase the drug permeability and retention in the tumor tissue. In addition, use of nanoliposomes as drug carriers reduces the side effects of doxorubicin such as cardiac toxicity.



### Certificates and Standards

- NanoScale Certification
- Iran Ministry of Health Certification

### About Company

Name of Company	Exir Nano Sina
Website	<a href="http://www.ens.co.ir">www.ens.co.ir</a>
Email	info@ens.co.ir



Nano Daru



# Cancer Treatment Drug (Paclinab)



## Introduction

This product is Paclitaxel albumin bound (Abraxane). Paclitaxel is a natural anti-cancer material which inhibits the process of cell division and growth of cancer cells. This drug uses albumin as carrier of water insoluble molecules in the body which selectively accumulates in tumor tissues. Unlike other solvent based chemotherapy drugs, this drug has no side effects because the effective anti-cancer material, paclitaxel, is placed inside albumin.



## Application

- Treating various cancer including breast cancer, pancreas, ovarian and lung



### Advantage of Using Nanotechnology

Nanoparticles increase drug penetration into the cancerous tissues and improve drug delivery to the tumor.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Nano Daru
Website	<a href="http://www.nanodaru.com">www.nanodaru.com</a>
Email	<a href="mailto:info@nanodaru.com">info@nanodaru.com</a>



# Sina Curcumin Capsule



## Introduction

This product is nano-micelles containing curcumin with the ability to disperse and dissolve in water. Curcumin is poorly absorbed into the body because it is insoluble in water. Therefore, the dissolution of curcumin in an aqueous medium is of great importance. Micelle is a surfactant molecule aggregate dispersed in a liquid colloid. It is a nanosized vesicular membrane which becomes soluble in water by gathering the hydrophilic heads outside in contact with the solvent and hydrophobic tails inside, which is known as emulsification. Loading the curcumin in nano-micelles enhances its dissolution and dispersion in water and helps it to absorb into the body. In general, the most important biological effects of turmeric and curcumin are anti-inflammatory, antioxidant and anti-cancer effects.



## Application

- Improving liver and digestive system function
- Adjunctive therapy for diabetes
- Repairing damaged tissues
- Reducing the side effects of chemotherapy
- Preventing blood clots in the vessels
- Cholesterol lowering supplement



## Advantage of Using Nanotechnology

The main issue regarding curcumin is that its absorption into the blood-stream is highly poor. Thus, to solve this problem, curcumin is loaded inside the nano-micelles which enhances the absorption of curcumin in the body and increases its performance.



## Certificates and Standards

- NanoScale Certification
- Iran Ministry of Health Certification

## About Company

Name of Company	Exir Nano Sina
Website	<a href="http://www.ens.co.ir">www.ens.co.ir</a>
Email	info@ens.co.ir



# Cutaneous Leishmaniasis Treatment Topical Gel (Sina Ampholish)



## Introduction

This product is a topical nanoliposomal gel 0.4% amphotericin B which is produced for the treatment of cutaneous leishmaniasis and can be topically applied. Amphotericin B is the most effective drug for the treatment of fungal and protozoan infections such as leishmaniasis. Due to renal toxicity caused by this drug, liposomal formulations can be used for targeted drug delivery. The liposomal form of this drug reduces its destructive effects on the body and increases its penetration and transfer to the surface of the fungi.



## Application

- Treatment of cutaneous leishmaniasis
- Effective in the treatment of topical fungal diseases



### Advantage of Using Nanotechnology

Liposomes are the most widely used antimicrobial drug delivery system. The major distinguishing feature of liposomes is its lipid bilayer structure, which mimics cell membranes and can readily fuse with infectious microbes. By directly fusing with bacterial membranes, the drug payloads of liposomes can be released to the cell membranes or the interior of the bacteria.



### Certificates and Standards

- NanoScale Certification
- Iran Ministry of Health Certification

### About Company

Name of Company	Exir Nano Sina
Website	<a href="http://www.ens.co.ir">www.ens.co.ir</a>
Email	info@ens.co.ir



EMAD pharmaceutical



# Antibacterial gauze (Agicoat)



## Introduction

This product is gauze dressing containing antibacterial silver nanoparticles. The process of wound healing is delayed by bacterial infections. Therefore, prevention and treatment of infection is an important part of wound healing. The dressing band containing silver nanoparticles with antibacterial properties is used for wound dressing. Due to the strong antibacterial properties of silver nanoparticles, this dressing is used to control the infection of wound or burn. This product applies its antimicrobial and anti-inflammatory effects by slow release of silver ions.



## Application

- Severe burns
- Acute diabetic ulcers
- Acute bed sores
- Chronic wounds



### Advantage of Using Nanotechnology

The silver antibacterial effect remarkably increases with size reduction up to nanoscale, in a way that they can kill more than 650 bacterial species. By decreasing particle size, the release of silver ions increases, which as a result improves antibacterial activity. Antibacterial effect of this product was evaluated by ISIRI 11070 standard.

ISIRI 11070: Inspection of antibacterial effect in textiles



### Certificates and Standards

- NanoScale Certification
- Iran Ministry of Health Certification

### About Company

Name of Company	Emad pharmaceutical Company
Website	<a href="http://www.emadpharma.com">www.emadpharma.com</a>
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# Wound Disinfectant Spray



## Introduction

Silver has a long and intriguing history as an antibacterial agent. Antimicrobial behavior of silver or its bioactive compounds is directly proportional to  $\text{Ag}^+$  ion release and its availability to interact with bacterial or fungal cell membranes. Silver metal and its mineral compounds are ionized in the presence of water or body fluids. The silver ion is biologically active and readily interacts with proteins, amino acid residues, free anions and receptors on mammalian and eukaryotic cell membranes. Silver exhibits low toxicity in the human body, and minimal risk is expected by inhalation, ingestion, dermal application. However, continuous contact with silver can cause skin and eye problems. By decreasing silver particle size, the release of silver ions increases because of increase in surface area. Colloidal silver is a mineral solution containing silver ions and small charged particles which are suspended in a liquid medium.



### Application

- Medical and antimicrobial applications
- In textiles and hygiene products
- Biomedicine production



### Advantage of Using Nanotechnology

The silver antibacterial effect remarkably increases with size reduction up to nanoscale, in a way that they can kill more than 650 bacterial species. By decreasing particle size, the release of silver ions increases, which as a result improves antibacterial activity.



### Certificates and Standards

- NanoScale Certification
- Iran Ministry of Health Certification

## About Company

Name of Company	Nano Alvand Arad
Website	<a href="http://www.nivashaa.com">www.nivashaa.com</a>
Email	nanoalvandarad@gmail.com



# Biomolecule Detection Kit



## Introduction

This product is a biomolecule LSPR detection kit that works based on the surface plasmon resonance (SPR) of gold nanoparticles, and is capable of detecting small amounts of biomolecules. Unlike bulk noble metals, their nanoparticles show a strong absorption band in the visible and ultraviolet region. The resonance condition is established when the frequency of incident photons matches the natural frequency of surface electrons. This phenomenon is called localized surface plasmon resonance (LSPR). In LSPR experiment, a biomolecule is attached to the nanoparticle surface. Based on the created bonding, the dielectric around the nanoparticles changes from water to the biomolecule. The amount of biomolecules attached to the surface of the nanoparticles is estimated based on the shift in the maximum absorption wavelength.



### Application

- Rapid detection of biomolecules



### Advantage of Using Nanotechnology

The LSPR peak is localized surface plasmon resonance which is specific to the nanoparticles, and sensing properties entirely depend on its size.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Nanomabna Iranian
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# Pregnancy Rapid Test Kit



## Introduction

In recent years, pregnancy rapid diagnostic kits have been widely used. With the advancement of nanotechnology, new kits have been introduced to the market to increase the accuracy and speed of detection. The pregnancy rapid test kit is a screening kit based on gold nanoparticles. This product works based on Immunochromatography, a combination of chromatography and immunoassay. In this technique, the antigen-antibody reaction which occurs on a membrane is used to determine the target analyte in the sample. During pregnancy, a hormone called human chorionic gonadotrophin (hCG) is produced, which circulates in the blood and is also present in the urine. The pregnancy test kit detects the presence of hCG in your urine. It is a qualitative test.



### Application

- >Mainly used for rapid detection of pregnancy



### Advantage of Using Nanotechnology

Pregnancy Rapid Test Kit contains gold nanoparticles which for rapid detection of pregnancy, the desired antibody has been bonded to the gold nanoparticles.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Zist Abzar Pajoohan
Website	<a href="http://www.zistabzar.com">www.zistabzar.com</a>
Email	<a href="mailto:info@zistabzar.com">info@zistabzar.com</a>



# Rapid Test Kit Family



## Introduction

Nowadays, rapid tests for detection and control of drugs based on immuno-chromatography methods have been widely developed. Lateral flow assay (LFA) is one of the common methods. The LFA detection kit is divided into two categories: sandwich assay and competitive assay. The drug rapid detection kit operates based on competitive assay. To make this kind of kits, the gold nanoparticles placed onto the release pad are attached to the drug detection antibody. This antibody is for limited concentration. When the analyte containing the drug is applied onto the sample pad and passed through the release pad, the nanoparticles attached to the existence drug in the sample. Few drug and antibody are placed on the test line and control line, respectively. When the attached nanoparticles to the antibody reach to the test line, the line color turns to clear and therefore the test is correct. The drug test kits produced by this company are as follows:

- Simultaneous rapid detection kit of Morphine, Amphetamine, Methamphetamine, Methadone and Marijuana
- Marijuana rapid detection kit

- Methadone rapid detection kit
- Amphetamine rapid detection kit
- Methamphetamine rapid detection kit
- Morphine rapid detection kit



### Application

- Mainly used for rapid detection of morphine, amphetamine, methamphetamine, methadone and marijuana



### Advantage of Using Nanotechnology

The above-mentioned rapid test kits contain gold nanoparticles which for rapid detection of drugs, the desired antibody has been bonded to the gold nanoparticles.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Zist Abzar Pajoohan
Website	<a href="http://www.zistabzar.com">www.zistabzar.com</a>
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# Sanitation and Health

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- Respirator Masks Family
- NFK Nano Mask
- HYDRODERM Lotion & Sunscreens Family
- SUNSAFE Sunscreens & Sunblock Fluids Family
- Highno Anti-waves Pregnancy Belt
- SilvoSept Products Family
- Family of Eco-friendly Nanoemulsion Cleaners
- Antibacterial Herbal Tonic
- Surface Disinfectant Solution (Nanonip)
- Hospital Disinfectant (Nano biocide)
- Antibacterial Epilation Pad
- Antibacterial Hospital Waste Bag
- Nanofill Hookah Filter
- ARDENE Sunscreens Family
- Family of Eco-friendly Nanoemulsion Cleaners



# Respirator Masks Family

## Introduction



The suspended particles which enter the body during inhalation, are able to disrupt the respiratory system. Pulmonary infections and respiratory disorders are of the common effects of dust. Therefore, the use of protective mask which does not allow the particulates to enter the respiratory system is necessary. The masks made of nanofibers include multiple layers, which one of the middle layers contains nanofibers with nanoscale diameter. These types of masks because of having high quality are widely used by different groups of people.

- Child respirator mask
- Adult valve mask
- Cosmetic respirator mask
- 6-layer industrial valve mask
- 7-layer industrial valve mask containing carbon active

### Application

- Suitable for people who are sensitive to dust and environmental pollutants
- Usable in public and urban environments
- Suitable for use in hospitals and operating rooms to prevent the transmission of pathogens

### Advantage of Using Nanotechnology

Nanofibers because of having high surface area, high length to width ratio, and low density are able to eliminate the large amounts of particles during the filtration process. The filtration efficiency was evaluated in accordance with EN 779.

EN 779: Classification of particulate air filters

### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Nano Tar Pak
Website	<a href="http://www.masknano.com">www.masknano.com</a>
Email	anotarpak@gmail.com



# NPK Nano Mask

## Introduction



A dust mask is a flexible pad held over the nose and mouth by elastic or rubber straps to protect against dusts encountered during construction or cleaning activities, such as dusts from drywall, brick, wood, fiberglass, silica (from ceramic or glass production), or sweeping. A dust mask can also be worn to protect against allergens. Nowadays, polymer nanofibers are used in manufacture of these kinds of masks to improve their efficiency. These nanofibers prevent the inhalation of particulate with a diameter of 2.5 microns or less, and also heavy metals in the polluted air which causes many diseases such as asthma or lung cancer.

## Application

- As a dust mask to protect against dusts encountered during construction or cleaning activities



### Advantage of Using Nanotechnology

Nanofibers because of having high surface area, high length to width ratio, and low density are able to eliminate the large amounts of particles during the filtration process.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Nano Fanavarani Khavar
Website	<a href="http://www.nanokhavar.com">www.nanokhavar.com</a>
Email	<a href="mailto:info@nanokhavar.com">info@nanokhavar.com</a>



Pars Hayan



# HYDRODERM Lotion & Sunscreens Family

## Introduction



The human skin naturally lacks the ability to deal with the adverse effects of sunlight. Ultraviolet light is generally divided into three sub-bands: UVA (320-400 nm), UVB (280-320 nm) and UVC (100-280 nm). When sunlight passes through atmosphere, all UVC and 90% of UVB light are absorbed by ozone, water vapor and carbon dioxide. UVA is less absorbed by the atmosphere; the light, therefore, reaches the earth only contains UVA, and UVB residue. UVA light through the formation of free radicals and creation of disorder in the skin refreshment process causes disease like progeria or freckles. Generally, both chemical and physical absorbents are used to absorb UV lights. In the formulation of these products the reflective natural materials like titanium dioxide are used. The products made by this company are as follows:

- Total sunblock cream (SPF:30)
- Total sunblock cream (SPF:60)
- Children total sunblock cream (SPF:30)
- Oil-free total sunblock lotion (SPF:60)
- Sunscreen Lip Balm (SPF:40)



### Application

- Skin protection against harmful UV lights



### Advantage of Using Nanotechnology

Titanium dioxide nanoparticles, as mineral absorbents, are used in this product. The use of titanium dioxide nanoparticles enhances the solar protection factor (SPF), which indicates the amount of harmful lights absorbance by sunscreen.



### Certificates and Standards

- NanoScale Certification
- Iran Ministry of Health Certification

## About Company

Name of Company	Pars Hayan
Website	<a href="http://www.parshayan.com">www.parshayan.com</a>
Email	tech@parshayan.com



Pars Hayan



# SUNSAFE Sunscreens & Sunblock Fluids Family

## Introduction



The human skin naturally lacks the ability to deal with the adverse effects of sunlight. Ultraviolet light is generally divided into three sub-bands: UVA (320-400 nm), UVB (280-320 nm) and UVC (100-280 nm). When sunlight passes through atmosphere, all UVC and 90% of UVB light are absorbed by ozone, water vapor and carbon dioxide. UVA is less absorbed by the atmosphere; the light, therefore, reaches the earth only contains UVA, and UVB residue. UVA light through the formation of free radicals and creation of disorder in the skin refreshment process causes disease like progeria or freckles. Generally, both chemical and physical absorbents are used to absorb UV lights. In the formulation of these products the reflective natural materials like titanium dioxide are used. The organic pigments in this product not only make the skin tanned but also it makes the skin to seem more shining and beautiful. The products made by this company are as follows:

- Physical sunblock fluid (SPF:50)
- Anti-aging sunscreen (SPF:50)

- Oil-free, anti-acne sunscreen (SPF:50)
- Tanning sunscreen (SPF:40)
- Sunscreen & anti-aging eye cream (SPF:30)



### Application

- Skin protection against harmful UV lights



### Advantage of Using Nanotechnology

Titanium dioxide nanoparticles, as mineral absorbents, are used in this product. The use of titanium dioxide nanoparticles enhances the solar protection factor (SPF), which indicates the amount of harmful lights absorbance by sunscreen.



### Certificates and Standards

- NanoScale Certification
- Iran Ministry of Health Certification

## About Company

Name of Company	Pars Hayan
Website	<a href="http://www.parshayan.com">www.parshayan.com</a>
Email	tech@parshayan.com



# Highno Anti-waves Pregnancy Belt

## Introduction



What we do know, is that the radiation at the levels emitted by cell phones and Wi-Fi does have a biological impact. Numerous studies have shown that it impacts the way cells grow, DNA replicates, and brain cells function. Because of this, health experts believe early childhood and pregnancy – when rapid and complex cell development occurs – are the times of highest risk. According to some studies, the more frequently a mother used a cell phone, the greater the risk that her child would have a behavioral problem. Mechanisms behind the connection have not been established, though it has been theorized that the radiation from cell phone use may affect the regulation of hormone secretion impacting metabolism and brain development. This product avoids exposure to electromagnetic radiation or at least reduces its impact on the fetus.



### Application

- This product is particularly used to protect the fetus from electromagnetic radiation



### Advantage of Using Nanotechnology

For protection against waves, use of a material with high electrical conductivity is necessary. The high electrical conductivity of nanoparticles leads to a decrease in the electromagnetic field induced by the absorption of waves within the protective material. The electromagnetic shielding effectiveness of this product was measured by ASTM D4935.

ASTM D4935 Standard: Standard Test Method for Measuring the Electromagnetic Shielding Effectiveness of Planar Materials



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Pishran Nassaji Ayandeh
Website	<a href="http://www.highno.com">www.highno.com</a>
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# SilvoSept Products Family

## Introduction



The disinfectant products made by this company, known as SilvoSept, eliminate a wide range of pathogens such as bacteria, viruses and fungi. In these products, the concentration of the active ingredient, i.e. silver, is in a completely safe range. When silver is exposed to oxygen, it instantly forms oxide and produces silver ions. The smaller the size of the silver particles, the more likely it is to produce silver ions; insofar as the silver nanoparticles because of having the high surface-to-volume ratio, release the maximum amount of ions in the media containing oxygen such as water. The products made by this company are as follows:

- Surface & floor cleaner
- Instrument cleaner
- Hand antiseptic
- Wound disinfectant

- Mouthwash
- Vehicle first aid kit
- Advanced first aid kit
- Companion first aid kit



### Advantage of Using Nanotechnology

Silver nanoparticles are stabilized easily in nano-dimension which leads to the formation of more stable colloids. It could be mentioned that in nano-dimension, antibacterial effect of silver increases significantly, so that they are able to remove over 650 bacterial species.



### Certificates and Standards

- NanoScale Certification
- Iran Ministry of Health Certification

### About Company

Name of Company	Chito Tech
Website	<a href="http://www.chitotech.com">www.chitotech.com</a>
Email	<a href="mailto:info@chitotech.com">info@chitotech.com</a>



# Family of Eco-friendly Nanoemulsion Cleaners

## Introduction



A detergent is a surfactant or a mixture of surfactants with cleaning properties in dilute solutions. Detergents are commonly available as powders or concentrated solutions. An emulsion is a mixture of two or more liquids that are normally immiscible (unmixable or unblendable). Emulsions are part of a more general class of two-phase systems of matter called colloids. Nanoemulsions are emulsions in which the droplet sizes are less than 100 nm. A typical nanoemulsion contains oil, water and an emulsifier. Since microemulsions are thermodynamically stable systems in equilibrium, they are sensitive to changes in temperature and composition. Therefore, nanoemulsions are attractive for aforementioned applications because they are relatively the least sensitive to physical and chemical changes and they can be kinetically stable over long time scales. This product is an alcohol free nanoemulsion that is used as a detergent for cleaning and polishing a variety of surfaces. The products made by this company are as

follows:

- Antibacterial cleaner spray for tablet and mobile
- Glass cleaner spray
- Multifunctional cleaner solution



### Application

- These products are used as detergents for cleaning a variety of surfaces



### Advantage of Using Nanotechnology

Nanoemulsions have a much higher surface area and free energy than microemulsions that make them an effective transport system. Moreover, nanoemulsions do not show the problems of flocculation, coalescence and sedimentation, which are commonly associated with microemulsions.



### Certificates and Standards

- NanoScale Certification
- Health approval of Food and Drug Administration

## About Company

Name of Company	Kimia Chemie Sahand
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Kimya Pajooresh  
Mahan



# Antibacterial Herbal Tonic

## Introduction



This product is herbal tonic containing silver nanoparticles which is produced to create antibacterial properties. Detergents are not suitable materials for cleaning the surfaces made of leather like furniture. This is because these materials damage the polymer chain, and over time lead to the corrosion and damage in the leather. After clearing the wood and leather surfaces, the product penetrates into the surface, and because of having the completely natural and herbal ingredients along with antibacterial agent makes the surfaces free from bacteria.

## Application



- In order to clean all types of leather and wood surfaces without corrosion, including furniture, bags and shoes, car seat, etc.



### Advantage of Using Nanotechnology

Silver is an effective antibacterial agent which in the form of nanoparticle is highly diffusible, insofar as it allows the chemical reactions to occur at a high rate. The antibacterial property of this product was evaluated by ISIRI 11070.

ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Kimya Pajoohest Mahan
Website	<a href="http://www.rozanatomic.com">www.rozanatomic.com</a>
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# Surface Disinfectant Solution (Nanonip)

## Introduction



Nanoparticles have a very high surface-to-volume ratio. This feature can be utilized in those fields which the specific surface area is of special paramount importance. Furthermore, some nanoparticles also have antibacterial properties, which the surface-to-volume ratio becomes more important. Colloidal silver is a mineral solution containing silver ions and small charged particles which are suspended in a liquid medium. The presence of colloidal silver in adjacent to viruses, fungi, bacteria or other single-cell pathogens will disable their oxygen metabolism enzyme. Within a few minutes, the pathogens are destroyed and removed by the immune system. This product consists of 50% silver in nanoparticle form and 50% silver in ionic form, which presents immediate and long-term effectiveness.



### Application

- Usable in food factories, livestock feed production, poultry farms, slaughterhouses and so forth



### Advantage of Using Nanotechnology

Silver nanoparticles are stabilized easily in nano-dimension which leads to the formation of more stable colloids. It could be mentioned that in nano-dimension, antibacterial effect of silver increases significantly, so that they are able to remove over 650 bacterial species.



### Certificates and Standards

- NanoScale Certification
- Iran Ministry of Health Certification

## About Company

Name of Company	Nano Part Khazar
Website	<a href="http://www.nanonip.com">www.nanonip.com</a>
Email	nanonip@yahoo.com



# Hospital Disinfectant (Nano biocide)



## Introduction

Silver nanoparticles have been used as colloidal silver for more than 100 years. Historically, colloidal silver containing silver with different concentrations and particle sizes has been widely used to treat wounds and infections. Penetration of silver into the bacteria cells induces a high degree of structural and morphological changes which lead to the death of that cell. Silver nanoparticles can prevent the growth or adhesion of bacteria onto the surface. This can be especially useful in the operation room, where all surfaces in contact with the patient's body should be sterilized. In addition, silver nanoparticles can be incorporated into a variety of surfaces, such as metal, plastic, and glass. This product has been introduced into the market with two different concentrations:

- Disinfectant containing 100 ppm silver nanoparticles
- Disinfectant containing 2000 ppm silver nanoparticles



### Application

- This product is particularly used to disinfect sensitive surfaces



### Advantage of Using Nanotechnology

Silver nanoparticles are stabilized easily in nano-dimension which leads to the formation of more stable colloids. It could be mentioned that in nano-dimension, antibacterial effect of silver increases significantly, so that they are able to remove over 650 bacterial species.



### Certificates and Standards

- NanoScale Certification
- Iran Ministry of Health Certification

## About Company

Name of Company	Nano Poshesh Felez
Website	<a href="http://www.nanochem.ir">www.nanochem.ir</a>
Email	nanopooshesh.co@gmail.com



# Antibacterial Epilation Pad



## Introduction

With growth in world population and the spread of disease, the number of antibiotic resistant microorganisms is rising along with the occurrence of infections from these microorganisms. By raising the health awareness, some people have focused their attention on educating and protecting themselves against harmful pathogens. Silver ions and their compounds are highly toxic to a wide range of bacteria, while they show very low toxicity to human cells. Insofar as the use of silver in various forms is a common method of protection against bacteria. It should be mentioned that the antibacterial effect of polymer-silver nanocomposite is durable, and manufactured products keep their antibacterial efficiency against a wide variety of bacteria.



## Advantage of Using Nanotechnology

The silver antibacterial activity remarkably increases with size reduction up to nanometer scale, in a way that they can kill more than 650 bacterial species. By decreasing particle size, the release of silver ions increases, which as a result improves antibacterial activity. Determining the antibacterial activity of this product was carried out by ISIRI 11070.

ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



## Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Isfahan Moghadam Manufacturing Industries
Website	<a href="http://www.isfahanmoghadam.com">www.isfahanmoghadam.com</a>
Email	<a href="mailto:Info@esfahanmoghadam.com">Info@esfahanmoghadam.com</a>



# Antibacterial Hospital Waste Bag

## Introduction



The use of plastic bags is a convenient and hygienic way to collect waste. Plastic bags are very lightweight, and are especially suitable for wet rubbish like food waste. The waste bags containing food waste and other spoilable materials are a suitable place for growth of bacteria which can cause contamination. The antibacterial nanoparticles prevent the growth of microorganisms which lead to contamination. The antibacterial nanoparticles prevent growth of microorganisms which give birth to spoilage and contamination. Zinc oxide nanoparticles show a strong antibacterial activity against the pathogenic bacteria such as *E. coli* and *S. aureus*. Addition of these kinds of nanoparticles to the waste bags can create antibacterial properties in them.



### Application

- Particularly for hospital waste collection



### Advantage of Using Nanotechnology

The zinc oxide antibacterial effect remarkably increases with size reduction up to nanoscale. By decreasing particle size, the release of zinc ions increases, which as a result improves antibacterial activity. Determining the antibacterial activity of this product was carried out by ISIRI 10900 standard.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Green Environment Nano Aras
Website	-
Email	greennano.aras@gmail.com



# Nanofill Hookah Filter

## Introduction



So far, more than 4,000 chemicals have been found in tobacco that contain compounds such as nicotine, free radicals, harmful gases, volatile organic compounds, aldehydes, aromatics, etc. Most of these compounds cause problems such as cancer and cardiovascular disease. To reduce the harmful effects of tobacco, filters are used. For instance, current cigarettes use cellulose and acetate filters which absorb some toxic compounds and carcinogens such as tobacco tar, nicotine and aromatic compounds. By using photocatalytic compounds such as TiO<sub>2</sub>, gaseous and solvent contamination can be reduced to some extent. This product is a hookah filter containing TiO<sub>2</sub> nanoparticles for reducing the harmful substances in tobacco smoke; the product also contains antibacterial silver nanoparticles for eliminating bacteria which generate in hookah hose.

## Application



- As hookah filter with the ability to remove harmful substances of tobacco



### Advantage of Using Nanotechnology

This product is a hookah filter containing TiO<sub>2</sub> and silver nanoparticles. Silver nanoparticle is a strong antibacterial agent which can eliminate a wide range of germs and bacteria. Furthermore, titanium oxide nanoparticles are also known for their ability to inhibit bacterial growth.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Hakiman Dourandish Pars
Website	<a href="http://www.nanofil.org">www.nanofil.org</a>
Email	hakimanpars@gmail.com



Pars Hayan



# ARDENE

## Sunscreens Family



### Introduction

The human skin naturally lacks the ability to deal with the adverse effects of sunlight. Ultraviolet light is generally divided into three sub-bands: UVA (320-400 nm), UVB (280-320 nm) and UVC (100-280 nm). When sunlight passes through atmosphere, all UVC and 90% of UVB light are absorbed by ozone, water vapor and carbon dioxide. UVA is less absorbed by the atmosphere; the light, therefore, reaches the earth only contains UVA, and UVB residue. UVA light through the formation of free radicals and creation of disorder in the skin refreshment process causes disease like progeria or freckles. Generally, both chemical and physical absorbents are used to absorb UV lights. In the formulation of these products the reflective natural materials like titanium dioxide are used. The products made by this company are as follows:

- Total sunblock, anti-wrinkles & lightening cream (SPF:35)
- Total sunblock cream, no chemical sunscreens (SPF:46)
- Total sunblock, tinted cream (SPF:90)



### Application

- Skin protection against harmful UV lights



### Advantage of Using Nanotechnology

Titanium dioxide nanoparticles, as mineral absorbents, are used in this product. The use of titanium dioxide nanoparticles enhances the solar protection factor (SPF), which indicates the amount of harmful lights absorbance by sunscreen.



### Certificates and Standards

- NanoScale Certification
- Iran Ministry of Health Certification

## About Company

Name of Company	Pars Hayan
Website	<a href="http://www.parshayan.com">www.parshayan.com</a>
Email	<a href="mailto:tech@parshayan.com">tech@parshayan.com</a>



# Family of Eco-friendly Nanoemulsion Cleaners



## Introduction

A detergent is a surfactant or a mixture of surfactants with cleaning properties in dilute solutions. Detergents are commonly available as powders or concentrated solutions. An emulsion is a mixture of two or more liquids that are normally immiscible (unmixable or unblendable). Emulsions are part of a more general class of two-phase systems of matter called colloids. Nanoemulsions are emulsions in which the droplet sizes are less than 100 nm. A typical nanoemulsion contains oil, water and an emulsifier. Since microemulsions are thermodynamically stable systems in equilibrium, they are sensitive to changes in temperature and composition. Therefore, nanoemulsions are attractive for aforementioned applications because they are relatively the least sensitive to physical and chemical changes and they can be kinetically stable over long time scales. This product is an alcohol free nanoemulsion that is used as a detergent for cleaning and

polishing a variety of surfaces. The products made by this company are as follows:

- Floor cleaner
- Wood cleaner and polisher spray
- Glass cleaner spray
- Multifunctional Cleaner Solution



### Application

- These products are used as detergents for cleaning and polishing a variety of surfaces



### Advantage of Using Nanotechnology

Nanoemulsions have a much higher surface area and free energy than microemulsions that make them an effective transport system. Moreover, nanoemulsions do not show the problems of flocculation, coalescence and sedimentation, which are commonly associated with microemulsions.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Setareh Taban Pak
Website	<a href="http://www.msk-el.com">www.msk-el.com</a>
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# Water and Environment

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- As removal systems
- Brackish water treatment systems
- Nitrate removal systems
- Textile waste water treatment
- Colored Wastewater Treatment Apparatus using Nanostructured Electrodes
- DPSN gray water treatment systems
- Antibacterial Geomembrane
- Pipes and Fittings Sealing Washers



# As removal systems

## Introduction



PNF Co., has offered As removal from drinking and non-drinking industrial water units using special high efficiency adsorbents which is suitable for different capacities. Due the high capacity of adsorption it has long time life.

These simply units don't need any chemicals and electricity so they have low fixed investment and operational cost. The cost of maintenance will mainly be related to the replacing adsorbents.

## Application

- Drinking water management, water treatment cases such as mining industries



### Advantage of Using Nanotechnology

Feature	
Portable	Easy disposal of spent media
User-friendly	Low operation cost
High capacity Arsenic removal (up to 99%)	Without water loss
No chemical & energy consumption	No need PH adjustment
Long life time of media	Card-reader (Optional)



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	PNF Co.
Website	<a href="http://www.pnf-co.com">www.pnf-co.com</a> <a href="http://www.pnaqua.com">www.pnaqua.com</a>
Email	<a href="mailto:info@pnf-co.com">info@pnf-co.com</a>



# Brackish water treatment systems

## Introduction



Desalination is considered as a common solution for the regions with shortage of fresh water resources. There are various methods for brackish and sea water desalination.

PNF Company has developed modified electro dialysis technology as an appropriate and efficient for desalination.

The developed process is an electrochemical technique in which the ionic contaminants are removed from the aqueous solution. In this method, separation of salt from water is conducted in the presence of anionic and cationic membranes under the influence of an electric field.

## Application



- Improve desalination processes and wastewater treatment in different industries, Agriculture purposes, and Drinking water management.



### Advantage of Using Nanotechnology

Feature
Desalination with an efficiency almost 85% -95%
Lower power consumption compared to other methods
Membrane lifetime more than 5 years
Low operational cost
No need pretreatment in most cases



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	PNF Co.
Website	<a href="http://www.pnf-co.com">www.pnf-co.com</a> <a href="http://www.pnaqua.com">www.pnaqua.com</a>
Email	<a href="mailto:info@pnf-co.com">info@pnf-co.com</a>



# Nitrate removal systems

## Introduction



According to reports on increasing nitrate concentration in the ground- and surface-water, in recent years, there is some dilemma for nitrate pollution in drinking water.

PNF Co. offers selective electro dialysis process as an efficient solution for nitrate removal from drinking water.

Electro dialysis technology is an advanced method in water and wastewater treatment for solute contaminants removal. In this method, the water flows through the cationic and anionic membranes and the nitrate ions conducted to an ion concentrated section as a trap via an induced electric field.

## Application

- Drinking water management, water treatment cases.



### Advantage of Using Nanotechnology

Feature
Maximum water recovery more than 97%
Energy consumption less than 0.2 kwh/m <sup>3</sup>
No need pretreatment in most cases
Membrane lifetime more than 10 years
Low operational cost



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	PNF Co.
Website	<a href="http://www.pnf-co.com">www.pnf-co.com</a> <a href="http://www.pnaqua.com">www.pnaqua.com</a>
Email	<a href="mailto:info@pnf-co.com">info@pnf-co.com</a>



# Textile waste water treatment

## Introduction



PNF Co has an innovational combination of methods to meet textile industries requirement. The most important advantages of the applied technologies are feasibility and efficiency in this problem.

In electro-oxidation process, a kind of electric current applied into the electrolytic reactor causes the colloidal impurities to de-stabilize, resulting in agglomeration and flotation and subsequent removal. Dissolved impurities contributing BOD/COD also get oxidized due to the oxidizing agents released by the electrolytic solution which changes them into a state that is either less colloidal and less emulsified (or soluble). Also, Color has been decreased during this process. PNF Co is using a special coated plates and also power source to improve the operation and also decrease power consumption of the electro-oxidation unit. Electro dialysis unit also is used to remove salts and other ionized contaminants and makes the water suitable for re use.



### Application

- Textile industries



### Advantage of Using Nanotechnology

Feature
Low operation cost
Water recovery to production cycle
Low occupied space



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	PNF Co.
Website	<a href="http://www.pnf-co.com">www.pnf-co.com</a> <a href="http://www.pnaqua.com">www.pnaqua.com</a>
Email	<a href="mailto:info@pnf-co.com">info@pnf-co.com</a>



# Colored Wastewater Treatment Apparatus using Nanostructured Electrodes

## Introduction



This device is a colored wastewater treatment apparatus using nano-structured graphite electrodes which operates based on electrolysis process. These electrodes are produced by cold plasma method. Carbon compounds, especially graphite, have great properties which make them interesting for utilization as a cathode electrode. Using different types of modification methods in different systems make colored compounds, p-nitrophenol contaminants, azo dyes elimination and hydrogen peroxide production possible. Among electrode modification methods, plasma-based methods are generally cheap, clean and easy, which require less time. In order to purify the wastewater, firstly the carbon electrodes are modified by the plasma process to increase specific surface area and  $H_2O_2$  production on the surface of the electrodes and then, modified electrodes are used as a cathode for electrolysis of wastewater.



### Application

- Removing organic pollutants by increasing the production of hydrogen peroxide



### Advantage of Using Nanotechnology

Nanostructured electrodes are better candidates for wastewater treatment; this stems from the fact that they have high surface to volume ratio which causes obtaining higher dissolved oxygen mass transfer coefficient.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Palayesh Plasma Sanat
Website	<a href="http://www.ppsplasma.com">www.ppsplasma.com</a>
Email	info@ppsplasma.com



# DPSN gray water treatment systems



## Introduction

In DPSN gray water treatment systems, gray water is treated using multi-channel platelet nanostructure ceramic membranes in a hybrid membrane process. Pore size of the applied ceramic membranes are engineered in nanometric scale to obtain high quality water for recycling in industrial applications, washing in domestic applications and agriculture consumptions. The used ceramic membranes in these systems are guaranteed for long times (5-10 years) with low fouling problems by applying intervallic back washing services.



## Application

- This system is used for gray water treatment using nanostructure ceramic membranes produced by DPSN company for industrial (car washes, carpet washes, stone cuttings, etc.) and domestic applications. The purified water can be used for some applications such as water to plants, washing, flash tank, etc.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Danesh Pajhohan Sanat Nano
Website	<a href="http://www.dpsn.co.ir">www.dpsn.co.ir</a>
Email	info@dpsn.co.ir

### Nanotechnology in Product

- High compact treatment systems
- More than 70 % water recycling
- Reducing of water consumption
  - More than 50% in domestic systems
  - More than 70% in industrial systems
- Disinfection without the carcass of microorganisms
- Guarantee of membranes for long times
- High automation of treatment systems
- Simple and economic treatment systems
- Applicable for gray waters in various ranges of pH and TDS/EC



# Antibacterial Geomembrane

## Introduction



Geomembrane is a very low permeable synthetic membrane which is used in various geotechnical engineering projects to control water or gas leakage. It has been confirmed that for this application, geomembranes are more efficacious than other traditional products such as concrete, asphalt, and compacted clay. This product has a wide range of properties, i.e. physical, mechanical and chemical resistance, to protect our environment and water resources. It is worth mentioning that the antibacterial activity of polymers reinforced with silver nanoparticles is stable and its high antibacterial efficiency has been observed against different species of bacteria. Silver ions and its compounds can kill a wide range of bacteria, while they have no toxic effect to the human body. Therefore, the use of silver in different forms is a common method of protection against bacteria.

## Application

- Drain for drinking water, liquid waste, etc.
- Insulating coating in reservoirs for preserving and storing required water for agriculture and fish breeding



## Advantage of Using Nanotechnology

The silver antibacterial activity remarkably increases with size reduction up to nanometer scale, in a way that they can kill more than 650 bacterial species. By decreasing particle size, the release of silver ions increases, which as a result improves antibacterial activity. Determining the antibacterial activity of this product was carried out by ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces



## Certificates and Standards

○ NanoScale Certification

## About Company

Name of Company	Decamond Industrial Manufacturing
Website	<a href="http://www.decamond.ir">www.decamond.ir</a>
Email	decamond@yahoo.com



# Pipes and Fittings Sealing Washers



## Introduction

This product is made of rubber-silica nanocomposite. Rubber is one of the most important commercial polymers. The polymer chains in rubber are long and flexible with a coiled and kinked nature. Under stress the molecular chain uncoils and an aligned structure results. This structure causes high stretch, large free volume fraction, and amorphous state, which causes unique properties such as low hardness, high elasticity and high elongation at fracture stress. The basic properties of rubber are not ideal for industrial applications and can be improved by adding fillers. The improved mechanical properties depend on good interface between matrix and filler because the applied load is mostly transferred through the filler via interface. In this product, addition of silica nanoparticles improved wear and tensile properties of nanocomposite.



### Application

- Sealing of pipes and fittings



### Advantage of Using Nanotechnology

The addition of nanoparticles to elastomer matrix creates many connection points in the particle-matrix interface. Enhancement of the nano-composite properties is due to the high proportion of the active surface of nanoparticles. This affects the viscoelasticity by an increase in viscosity, limitation of chain mobility and improvement in mechanical properties. The evaluation of tensile strength and wear resistance of this product was carried out by ASTM D412-15a and ISO 4649, respectively.

ASTM D412-15a: Standard Test Methods for Vulcanized Rubber and Thermoplastic Elastomers-Tension

ISO 4649: Rubber, vulcanized or thermoplastic- Determination of abrasion resistance using a rotating cylindrical drum device



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Farapishtaz Company
Website	<a href="http://www.farapishtaz.com">www.farapishtaz.com</a>
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# Construction and Building

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- Low-emissivity Glass
- Silent Sewage Pipes
- Concrete Flooring Contains Silica Nanoparticles
- Epoxy Stone Adhesive Containing Nanoparticles
- Hydrophobic Solution Containing Silica Nanoparticle (Nanosil)
- Sanitary Faucet
- Water Repellent Rockwool Blanket
- Water Repellent Rockwool Quilt
- Water Repellent Rockwool Slab
- Water Repellent Rockwool Tube
- Smart Epoxy Flooring
- Stain Repellent Granite Tile
- Structural Lightweight Concrete (NSLC-1230)
- Sanitary Faucet
- UPVC Nanocomposite Profiles
- Bitumen Additive (ZycoTherm)
- Outdoor Lighting with Hydrophobic Coating
- Golden Steel Sheet for Facades
- Antibacterial Squat Toilet
- Antibacterial Wash Basin containing ZnO Nanoparticles
- Antibacterial Toilet
- Manhole Cover
- Antibacterial Tile
- Hard UPVC Pipe containing Nanoparticles
- Hard UPVC Construction Sewage Fittings
- UPVC Rainwater Pipe
- UPVC Sewer Pipes
- UPVC Water supply Pipe
- Hard UPVC Fittings
- UPVC Door and Window Profiles containing Nanoparticles
- Antibacterial Ceramic containing ZnO Nanoparticles
- Antibacterial Tile containing ZnO Nanoparticles



# Low-emissivity Glass



## Introduction

This product is a heat transfer controller glass containing metallic and ceramic nanolayers, which are designed to prevent heat transfer. To reduce the energy loss through the building windows, glasses with special coatings known as Low-E (low emissivity) are used. As a result, when the glass is heated, it reflects the heat instead of emitting it. The produced double-glazed glass has an energy-efficient pane which has a heat transfer coefficient much lower than that of ordinary glass which saves energy in hot and cold seasons and acts as a transparent thermal insulation.



## Application

- Glass used in buildings, commercial centers and offices
- Windows and building facades for controlling heat and cold
- Production of double-glazed glass with low heat transfer coefficient



### Advantage of Using Nanotechnology

This low-e glass has been produced through the deposition of metallic and ceramic nanolayers by using magnetron sputtering. Nanocoating in low-e glass allows the transmission of visible light, but reflects infrared and UV lights. The evaluation of thermal energy loss was carried out in accordance with EN 1096-1:2012 standard.

EN 1096-1:2012: Glass in building - Coated glass - Part 1: Definitions and classification



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Kaveh Glass Industry Group
Website	<a href="http://www.kavehglass.com">www.kavehglass.com</a>
Email	a-ghorbani@kavehglass.com



# Silent Sewage Pipes

## Introduction



Today's modern life causes many new abnormalities in societies, one of which is the noise pollution. With decrease in living space in big cities and use of light and durable materials, new standards have been enacted to control sound in modern societies. For instance, interior equipment like fans, ceiling- or wall-mounted fan coils, hot and cold water plumbing systems and sanitary sewer systems are the main factors which produce noise pollution. Therefore, when choosing, sound production standards should be considered as an important criteria. Amongst above-mentioned instances, sewage pipelines play an important role in the noise pollution of the interior space.

## Application

- Particularly for sewer pipes and fittings



### **Advantage of Using Nanotechnology**

This product composed of three layers, in which the middle layer is a nanocomposite material. The middle layer not only obviates sound pollution but also improves mechanical properties. It is worth mentioning that this product has passed sound insulation standards such as DIN 4109.



### **Certificates and Standards**

- NanoScale Certification

### **About Company**

<b>Name of Company</b>	Vahid industrial group
<b>Website</b>	<a href="http://www.vahidgroup.com">www.vahidgroup.com</a>
<b>Email</b>	<a href="mailto:info@vahidgroup.com">info@vahidgroup.com</a>



# Concrete Pavement block



## Introduction

Concrete is unique in construction and it is only an exclusive product for trading; so it involves a significant share of research and development, and income in the industry to itself. Concrete, a multi-phase, complex and nanostructured material, is a composite structure mainly composed of cement and water. Nanoscience and nanoengineering of concrete are phrases which describe two essential approaches regarding the application of nanotechnology in concrete. Up to now, concrete has been primarily known as a structural material. Nanotechnology is capable of making a multi-functional material from concrete. Concrete can be nanoengineered by incorporating nanoscale building blocks, nanoparticles, nanotubes, etc.



## Application

- Particularly for floor covering



### Advantage of Using Nanotechnology

Silica nanoparticles are a highly effective pozzolan. It has been proven that they are an excellent additive to improve the strength and durability of the concrete and decrease its permeability. The evaluation of flexural, compressive and tensile strengths was performed using ISIRI 755-2, ISIRI 20185 and ASTM C936 standards, respectively.

ISIRI 755-2: Terrazzo tiles- part 2: For External Uses-Specifications and Test methods

ISIRI 20185: Concrete flooring blocks- Requirements and test methods

ASTM C936: Standard Specification for Solid Concrete Interlocking Paving Units



### Certificates and Standards

○ NanoScale Certification

### About Company

Name of Company	Aptus Iran
Website	<a href="http://www.aptusiran.com">www.aptusiran.com</a>
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# Epoxy Stone Adhesive Containing Nanoparticles

## Introduction



Generally, epoxies are duple systems which are designed for bonds with high functionality and they are great for adhesive industry. Epoxy adhesives can cover a range of flexibility and transparency in addition to good performance. Epoxies are great for filling the gaps due to their excellent adhesion. Since the main usage of these adhesives is for outdoor applications (facades), it must have great resistance to many items. It is deducted recently that dispersion of inorganic nanoparticles in polymeric adhesives matrix in low concentrations may cause an essential improve in shear strength of structural bonds.

## Application



- An alternative mortar for current building mortars and is used to stick stone, concrete and bricks



### **Advantage of Using Nanotechnology**

Silica nanoparticles as functional fillers can be used in adhesives to improve mechanical properties, including modulus, strength, hardness, compressive strength and etc. Compressive strength and sagging feature of this product were evaluated by ASTM D695-02a and ASTM C881 standards, respectively.

ASTM D695-02a: Standard Test Method for Compressive Properties of Rigid Plastics

ASTM C881: Standard Specification for Epoxy-Resin-Base Bonding Systems for Concrete



### **Certificates and Standards**

○ NanoScale Certification

### **About Company**

<b>Name of Company</b>	ALVAN Paint and Resin Corporation
<b>Website</b>	<a href="http://www.alvanpaint.com">www.alvanpaint.com</a>
<b>Email</b>	info@alvanpaint.com



# Hydrophobic Solution (Nanosil)

## Introduction



Moisture is one of the main factors destroying building view. Water and moisture penetration into building materials is a known issue. Most of building materials have pores, so water will penetrate into them easily. In order to prevent destruction of building view, peeling of paint or growth of mold or bacteria, hydrophobicity of building material surfaces is necessary. In addition to hydrophobicity, keeping building materials in contact with air has a major importance. This product helps building materials to keep in touch with air in addition to hydrophobicity through nanotechnology. Moreover, because of diffusion feature of this coating, it will be more durable.

## Application

- This product can be used for bricks, natural mineral stones, lime brick, plaster and concrete surfaces, etc.



### Advantage of Using Nanotechnology

Addition of silica nanoparticles to this solution makes it hydrophobic, which can be used to treat other surfaces to become hydrophobic; this is due to the morphology of the silica particles once they adhere to their host. The silica particles then alter the surface of its host material resulting in a hydrophobic surface. The evaluation of surface wettability and contact angle measurement was carried out in accordance with the ASTM D7334.

ASTM D7334: Standard Practice for Surface Wettability of Coatings, Substrates and Pigments by Advancing Contact Angle Measurement



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	ALVAN Paint and Resin Corporation
Website	<a href="http://www.alvanpaint.com">www.alvanpaint.com</a>
Email	<a href="mailto:info@alvanpaint.com">info@alvanpaint.com</a>



# Sanitary Faucet



## Introduction

As the quality of water used for each person is extremely high, the quality and beauty of the valves used at each home is also important. Generally, faucets are made of either brass or lead alloys, so just their coatings make them look different. In addition to the alloy used in faucets, plating is of great importance, which can have a significant effect on the corrosion resistance of the faucet; the better quality of plating, the longer it remains the faucets become worn-off. Some types of decorative coatings which are used for faucets include brass, bronze, copper and steel. Nonetheless, today's, faucets with nanostructured coatings with higher hardness and corrosion resistance are produced because manufacturers are always looking for products with more beauty, quality and lifetime. TiN coating is the most recognized decorative nanostructured coating.



## Application

- bathroom taps
- Toilet taps
- kitchen taps



## Advantage of Using Nanotechnology

The use of nanostructured coating improves hardness and corrosion resistance of this product. Determining the hardness of this product was carried out by ISIRI 7810-1.

ISIRI 7810-1: Metal Materials- Vickers Hardening Test- Part I: Test Procedure



## Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Avisa
Website	<a href="http://www.avisa.co">www.avisa.co</a>
Email	Info@avisa.co



# Water Repellent Rockwool Blanket

## Introduction



Insulations are generally used to insulate heat, refrigeration, moisture, fire, sound, etc. Rockwool is part of the family of thermal insulations consisting of mineral fibers with a diameter of 4 to 9 microns and a length of 5 to 85 mm. The rockwool fiber structure provides excellent acoustic properties and sound absorption for this type of insulation. Moreover, high thermal resistance, non-flammability and smoke distribution places this kind of insulation in the classification of fireproof insulations. However, on exposure to rainwater and moisture, rockwool can absorb water; the thermal conductivity of the rockwool dramatically depends on the amount of water absorption; and not only it will increase thermal conductivity of rockwool but also it leads to corrosion. To avoid these problems, this product contains hydrophobic nanoparticles which reduce water absorption.



### Application

- Air-conditioning systems, flanges and central-heating systems
- Oil, gas and petrochemical industries
- Furnaces, Turbines, Tanks, etc.



### Advantage of Using Nanotechnology

This product contains hydrophobic nanoparticles which reduce water absorption. The evaluation of water absorption of this product was performed in accordance with ISIRI 8116 standard.

ISIRI 8116: Thermal insulation products for buildings - Factory made mineral wool products - Specifications



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Ayegh Sepahan
Website	<a href="http://www.ayeghsepahan.com">www.ayeghsepahan.com</a>
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# Water Repellent Rockwool Quilt



## Introduction

Insulations are generally used to insulate heat, refrigeration, moisture, fire, sound, etc. Rockwool is part of the family of thermal insulations consisting of mineral fibers with a diameter of 4 to 9 microns and a length of 5 to 85 mm. The rockwool fiber structure provides excellent acoustic properties and sound absorption for this type of insulation. Moreover, high thermal resistance, non-flammability and smoke distribution places this kind of insulation in the classification of fireproof insulations. However, on exposure to rainwater and moisture, rockwool can absorb water; the thermal conductivity of the rockwool dramatically depends on the amount of water absorption; as far as the thermal conductivity increases with increase in water absorption. Furthermore, water absorption leads to corrosion. To avoid these problems, this product contains hydrophobic nanoparticles which reduce water absorption.

### Application

- Dropped ceiling cover
- Air circulation channels
- Water cooling systems
- Residential and industrial buildings

### Advantage of Using Nanotechnology

This product contains hydrophobic nanoparticles which reduce water absorption. The evaluation of water absorption of this product in accordance with ISIRI 8116 standard.

ISIRI 8116: Thermal insulation products for buildings - Factory made mineral wool products - Specifications

### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Ayegh Sepahan
Website	<a href="http://www.ayeghsepahan.com">www.ayeghsepahan.com</a>
Email	<a href="mailto:info@ayeghsepahan.com">info@ayeghsepahan.com</a>



# Water Repellent Rockwool Slab



## Introduction

Insulations are generally used to insulate heat, refrigeration, moisture, fire, sound, etc. Rockwool is part of the family of thermal insulations consisting of mineral fibers with a diameter of 4 to 9 microns and a length of 5 to 85 mm. The rockwool fiber structure provides excellent acoustic properties and sound absorption for this type of insulation. Moreover, high thermal resistance, non-flammability and smoke distribution places this kind of insulation in the classification of fireproof insulations. However, on exposure to rainwater and moisture, rockwool can absorb water; the thermal conductivity of the rockwool dramatically depends on the amount of water absorption; as far as the thermal conductivity increases with increase in water absorption. Furthermore, water absorption leads to corrosion. To avoid these problems, this product contains hydrophobic nanoparticles which reduce water absorption.



### Application

- Petrochemical Complex, Refineries, Power Plants
- Buildings (floors, walls, ceilings)
- Sandwich panels



### Advantage of Using Nanotechnology

This product contains hydrophobic nanoparticles which reduce water absorption. The evaluation of water absorption of this product in accordance with ISIRI 8116 standard.

ISIRI 8116: Thermal insulation products for buildings - Factory made mineral wool products - Specifications



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Ayegh Sepahan
Website	<a href="http://www.ayeghsepahan.com">www.ayeghsepahan.com</a>
Email	<a href="mailto:info@ayeghsepahan.com">info@ayeghsepahan.com</a>



# Water Repellent Rockwool Tube



## Introduction

Insulations are generally used to insulate heat, refrigeration, moisture, fire, sound, etc. Rockwool is part of the family of thermal insulations consisting of mineral fibers with a diameter of 4 to 9 microns and a length of 5 to 85 mm. The rockwool fiber structure provides excellent acoustic properties and sound absorption for this type of insulation. Moreover, high thermal resistance, non-flammability and smoke distribution places this kind of insulation in the classification of fireproof insulations. However, on exposure to rainwater and moisture, rockwool can absorb water; the thermal conductivity of the rockwool dramatically depends on the amount of water absorption; as far as the thermal conductivity increases with increase in water absorption. Furthermore, water absorption leads to corrosion. To avoid these problems, this product contains hydrophobic nanoparticles which reduce water absorption.



### Application

- Air-conditioning systems, flanges and central-heating systems
- Oil, gas and petrochemical industries
- Food industry



### Advantage of Using Nanotechnology

This product contains hydrophobic nanoparticles which reduce water absorption. The evaluation of water absorption of this product in accordance with ISIRI 8116 standard.

ISIRI 8116: Thermal insulation products for buildings - Factory made mineral wool products - Specifications



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Ayegh Sepahan
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Email	<a href="mailto:info@ayeghsepahan.com">info@ayeghsepahan.com</a>



# Epoxy Flooring

## Introduction



Coatings are applied onto the surfaces for different purposes including improvement of surface properties such as appearance, adhesion, wear resistance, corrosion resistance and scratch resistance. Nowadays, by using nanotechnology, the ability to increase the surface properties of coatings has increased remarkably. BASA Polymer company has provided epoxy-silica nanocomposite floor coating with higher wear resistance than that of common flooring, which leads to protecting the surfaces against wear.

## Application



- Clean rooms and hygienic places
- Food and beverages industries
- Residential and commercial places



### Advantage of Using Nanotechnology

The presence of silica nanoparticles in this coating enhances the abrasion resistance and hardness. It is worth mentioning that the evaluation of the abrasion resistance was carried out in accordance with the ASTM D4060 standard.

ASTM D4060: Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser



### Certificates and Standards

- NanoScale Certification
- Iran Standard Certification

### About Company

Name of Company	BASA Polymer
Website	<a href="http://www.basapolymer.com">www.basapolymer.com</a>
Email	<a href="mailto:info@basapolymer.com">info@basapolymer.com</a>



# Easy-Clean Granite Tile



## Introduction

Contrary to the compact structure, the presence of surface cavities with nanometer and micrometer dimensions makes the tile sensitive to the stain and penetration of the contamination. Colloidal nano silica acts as a binder, polishing agent and coating to fill these pores and prevent the stains and dirt from penetrating into the surface.



## Application

- Commonly used to cover floors and walls, especially in hospitals, clinics, etc.



### Advantage of Using Nanotechnology

Silica nanoparticles act as a binder, polishing agent and coating to fill the surface pores and prevent the stains and dirt from penetrating into the surface. Tests show that, after polishing the product with the silica nanoparticles, the roughness and surface cavities reduced.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Behceram Tile and Granite
Website	<a href="http://www.behceramco.com">www.behceramco.com</a>
Email	behceramtrade@yahoo.com



# Structural Lightweight Concrete (NSLC-1230)



## Introduction

Structural lightweight concrete has an in-place density on the order of 1400 to 1900 kg/m<sup>3</sup> compared to normal-weight concrete with a density in the range of 2000 to 2400 kg/m<sup>3</sup>. For structural applications, the concrete strength should be greater than 17 MPa. The concrete mixture is made with lightweight coarse aggregate. In some cases, a portion or the entire fine aggregate may be a lightweight product. Lightweight aggregates used in structural lightweight concrete are typically expanded shale, clay or slate materials that have been fired in a rotary kiln to develop a porous structure.



## Application

- Shipbuilding and Offshore structures
- Construction and reconstruction of bridges
- Construction of earthquake-resistant structures



### **Advantage of Using Nanotechnology**

Silica nanoparticle possess more Pozzolanic nature. It has the capability to react with the free lime during the cement hydration and forms additional C-S-H gel giving strength, impermeability and durability to concrete. The evaluation of the compressive strength of the concrete was carried out in accordance with the ASTM C39.

ASTM C39: Standard Test Method for Compressive Strength of Cylindrical Concrete Specimens



### **Certificates and Standards**

- NanoScale Certification

### **About Company**

<b>Name of Company</b>	Behdis Saman Amin
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# Sanitary Faucet



## Introduction

As the quality of water used for each person is extremely high, the quality and beauty of the valves used at each home is also important. Generally, faucets are made of either brass or lead alloys, so just their coatings make them look different. In addition to the alloy used in faucets, plating is of great importance, which can have a significant effect on the corrosion resistance of the faucet; the better quality of plating, the longer it remains the faucets become worn-off. Some types of decorative coatings which are used for faucets include brass, bronze, copper and steel. Nonetheless, todays, faucets with nanostructured coatings with higher hardness and corrosion resistance are produced because manufacturers are always looking for products with more beauty, quality and lifetime. TiN coating is the most recognized decorative nanostructured coating.



## Application

- bathroom taps
- Toilet taps
- kitchen taps



### **Advantage of Using Nanotechnology**

The use of nanostructured coating improves hardness and corrosion resistance of this product. Determining the hardness of this product was carried out by ISIRI 7810-1.

ISIRI 7810-1: Metal Materials- Vickers Hardening Test- Part I: Test Procedure



### **Certificates and Standards**

- NanoScale Certification

### **About Company**

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# UPVC Nanocomposite Profiles



## Introduction

This product is unplasticized polyvinyl chloride (UPVC) nanocomposite profile containing nanoparticles. UPVC is among the widely used polymers in building construction which is the more suitable option compared to metal and wooden profiles due to features such as high durability and performance, easy formability, low thermal expansion, prevention of the energy loss and non-flammability. However, the brittleness and loss of color during exposure to UV radiation are some disadvantages of these profiles. as a solution, nanomaterials are added to the UPVC which improve the impact strength of the product.



## Application

- Door and window profiles



### Advantage of Using Nanotechnology

The size of the selected nanoparticles and their high surface area lead to the cavitation mechanism in the nanocomposite structure. This mechanism reduces the growth energy of the cracks and improves the failure threshold of the product.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Donyaye Profile Gharb
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# Outdoor Lighting with Hydrophobic Coating

## Introduction



This product is an outdoor lighting which coated with a layer containing hydrophobic silica nanoparticles that results in easy cleaning. Hydrophobicity is one of the physical properties of a material. Due to their micro- or nanoscale surface roughness, hydrophobic materials prevent absorbing or penetrating of water onto a surface. To achieve a hydrophobic surface, it is necessary to create a surface with low surface tension along with suitable microstructure. Silanes are silicon chemicals that possess a hydrolytically sensitive center that can react with inorganic substrates such as glass to form stable covalent bonds and possess an organic substitution that alters the physical interactions of treated substrates. Reaction of these silanes starts with hydrolysis of the three labile groups followed by condensation to oligomers. The oligomers then hydrogen bond with OH groups of the substrate. Finally, during drying or curing, a covalent linkage is formed with the substrate with concomitant loss of water.

## Application

- Particularly for outdoor illumination



### Advantage of Using Nanotechnology

Use of silane-based nanocoating gives hydrophobic property to this product. The evaluation of surface wettability and contact angle measurement was carried out in accordance with ASTM D7334.

ASTM D7334: Standard Practice for Surface Wettability of Coatings, Substrates and Pigments by Advancing Contact Angle Measurement



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Golnoor Company
Website	<a href="http://www.golnoor.com">www.golnoor.com</a>
Email	rd6@golnoor.com



# Golden Steel Sheet for Facades



## Introduction

The design of the facade is of great importance in every building, because it is the first part of the building to be exposed, and it will be very effective in creating the initial mentality of someone who enters the building. The use of special designs and colors in interior and exterior decoration is welcomed by manufacturers and buyers. One of the more recent designs is the use of golden elements made of stainless steel with TiN golden coatings. These ceramic coatings, in addition to the strength and mechanical properties, provide good corrosion resistance. There are different methods to apply TiN coatings on substrates. Arc-PVD is a kind of physical vapor deposition technique in which an electric arc is used to vaporize material from a cathode target. The vaporized material then condenses on a substrate and forms a thin film.



## Application

- Interior and exterior facade of buildings, elevators and other decorative applications



### Advantage of Using Nanotechnology

Creating nanostructured coatings on the substrate will improve the abrasion, erosion and corrosion properties of the substrate.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Mandegar Steel Pars
Website	<a href="http://www.mstpars.com">www.mstpars.com</a>
Email	<a href="mailto:moharrami.company@gmail.com">moharrami.company@gmail.com</a>



# Antibacterial Ceramic Sanitary wares



## Introduction

When using public restrooms, people are often worried about sanitary issues and their related illnesses. People are often sensitive to this issue, so they take special care when using and touching the equipment. Genital infections, fungal infections, skin sensitization and infectious, and microbial diseases are one of the most common causes of these bacteria. This product is an antibacterial squat toilet containing zinc oxide nanoparticles. The antibacterial squat toilet has surfaces which are resistant to bacterial growth. Sanitary products like wash basin are coated with materials which remove hazardous microorganisms, such as bacteria, viruses, fungi and other germs. In comparison with other metal oxides, the application of zinc oxide in biomedical and antiviral fields is due to its compatibility, solubility in alkaline environments, and terminated polar surfaces.



## Application

- Squat toilets are used in public toilets, household toilets, etc.



### Advantage of Using Nanotechnology

The use of zinc oxide nanoparticles causes antibacterial effect due to increased specific surface area, particle surface reactivity and photocatalytic properties. Determining the antibacterial activity of this product was carried out in accordance with ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Marjan Sanitary
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Email	<a href="mailto:info@marjansanitary.com">info@marjansanitary.com</a>



# Antibacterial Wash Basin

## Introduction



When using public restrooms, people are often worried about sanitary issues and their related illnesses. People are often sensitive to this issue, so they take special care when using and touching the equipment. Genital infections, fungal infections, skin sensitization and infectious, and microbial diseases are one of the most common causes of these bacteria. This product is an antibacterial sanitary wash basin containing zinc oxide nanoparticles. The antibacterial wash basin has surfaces which are resistant to bacterial growth. Sanitary products like wash basin are coated with materials which remove hazardous microorganisms, such as bacteria, viruses, fungi and other germs. In comparison with other metal oxides, the application of zinc oxide in biomedical and antiviral fields is due to its compatibility, solubility in alkaline environments, and terminated polar surfaces.

## Application

- Washing hands, dishwashing, and other purposes





### Advantage of Using Nanotechnology

The use of zinc oxide nanoparticles causes antibacterial effect due to increased specific surface area, particle surface reactivity and photocatalytic properties. Determining the antibacterial activity of this product was carried out by ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Marjan Sanitary
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Email	<a href="mailto:info@marjansanitary.com">info@marjansanitary.com</a>



# Antibacterial Toilet



## Introduction

When using public restrooms, people are often worried about sanitary issues and their related illnesses. People are often sensitive to this issue, so they take special care when using and touching the equipment. Genital infections, fungal infections, skin sensitization and infectious, and microbial diseases are one of the most common causes of these bacteria. This product is an antibacterial squat toilet containing zinc oxide nanoparticles. The antibacterial toilet has surfaces which are resistant to bacterial growth. Sanitary products like wash basin are coated with materials which remove hazardous microorganisms, such as bacteria, viruses, fungi and other germs. In comparison with other metal oxides, the application of zinc oxide in biomedical and antiviral fields is due to its compatibility, solubility in alkaline environments, and terminated polar surfaces.



## Application

- Antibacterial toilets are used in public toilets, household toilets, etc.



### Advantage of Using Nanotechnology

The use of zinc oxide nanoparticles causes antibacterial effect due to increased specific surface area, particle surface reactivity and photocatalytic properties. Determining the antibacterial activity of this product was carried out by ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Marjan Sanitary
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Email	<a href="mailto:info@marjansanitary.com">info@marjansanitary.com</a>



# Manhole Cover

## Introduction



A manhole cover is a removable plate forming the lid over the opening of a manhole, an opening large enough for a person to pass through that is used as an access point for maintenance and other work on an underground utility vault or pipe. It is designed to prevent anyone or anything from falling in, and to keep out unauthorized persons and material.

Manhole covers are often made out of cast iron, concrete or a combination of the two, which makes them heavy, usually weighing more than 50 kilograms. Manhole covers may also be made from glass-reinforced plastic or other composite material. Despite their weight and cumbersome nature, manhole covers are sometimes stolen, usually for resale as scrap. Therefore, polymer manholes are developing throughout the world due to their low cost, high mechanical strength, and chemical and corrosion resistance.

## Application

- Particularly used as manhole cover



### **Advantage of Using Nanotechnology**

nanomaterial additives increase the strength, modulus, and toughness of the polymer matrix. The evaluation of compressive strength and permanent set was carried out in accordance with ISIRI 14976.

ISIRI 14976: Gully tops and manhole tops for vehicular and pedestrian areas



### **Certificates and Standards**

- NanoScale Certification

### **About Company**

Name of Company	Matin Technical Design Company
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# Antibacterial Tile



## Introduction

Ceramic tiles due to having excellent chemical stability, as well as good appearance are widely used in different places such as hospitals and buildings. normally, the microorganisms reproduce easily on the ceramic tile surface, especially in wet environment. The silver-titanium nanocomposite particles have an antibacterial effect which can kill more than 650 different types of bacteria and they are not harmful to the environment and the human body. The silver-titanium nanocomposite particles along with silver ions in the ceramic glaze, penetrate the cell walls of bacteria and microorganisms and prevent their growth and reproduction. These nanoparticles can be mixed with ceramic glaze as an additive.



## Application

- Construction of antibacterial walls and floors



### **Advantage of Using Nanotechnology**

Addition of silver-titanium nanocomposite particles as an additive to the ceramic glaze creates antibacterial effect in the tile. Determining the antibacterial activity of this product was carried out in accordance with the ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces



### **Certificates and Standards**

- NanoScale Certification
- Health approval of Food and Drug Administration

### **About Company**

Name of Company	Nano Pishtaz Pars
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# Hard UPVC Pipe

## Introduction



Polyvinyl chloride (PVC) is the third most common synthetic polymer after polyethylene (PE) and polypropylene (PP). PVC is a lightweight plastic that is used in the construction. Addition of lubricants makes this material softer and more flexible than plastics. If no lubricants or plasticizers are added to it, the resulting material is known as UPVC (unplasticized polyvinyl chloride). UPVC has high chemical resistance across its working temperature range, with a wide range of operating pressures. Due to some features including long-term strength, high stiffness and affordability, UPVC systems are widely used in plastic fittings and pipes. It has been demonstrated that the addition of nanoparticles significantly improves the strength and stiffness of UPVC.

## Application



- Particularly in wastewater transfer systems



### Advantage of Using Nanotechnology

Addition of nanoparticles significantly improves the strength and stiffness of UPVC. The evaluation of impact property was performed according to ISIRI 9119.

ISIRI 9119: plastics-Unplasticized poly (vinyl chloride) (PVC-U) pipe, fittings and piping system for soil and waste discharge within building structure- specifications



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Paydar Polymer
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Email	info@ paydarpolymer.com



# Hard UPVC Construction Sewage Fittings



## Introduction

Unplasticized polyvinyl chloride (UPVC) is one of the lightweight polymers that have high strength and impact resistance. Pipes and fittings made of this material exhibit excellent resistance in corrosive environments. Nano-scale fillers due to their high specific surface area give these polymers unique properties. Addition of nanoparticles to the UPVC polymer improves its mechanical and physical properties. This product is a nanocomposite 90 degree elbow, in which the addition of nanoparticles has improved the impact resistance, thermal stability and Vicat softening temperature.



## Application

- Pipes, fittings and plumbing system used in buildings water and waste-water systems



### Advantage of Using Nanotechnology

Addition of nanoparticles increases the strength, modulus and toughness of polymer matrix. These unusual properties are due to the high specific surface area of nanoparticles. The evaluation of mechanical properties was performed according to ISIRI 9119.

ISIRI 9119: plastics-Unplasticized poly (vinyl chloride) (PVC-U) pipe, fittings and piping system for soil and waste discharge within building structure- specifications



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Pishgam Plast Ahvaz
Website	<a href="http://www.pishgamplast.com">www.pishgamplast.com</a>
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# UPVC Rainwater Pipe



## Introduction

Rainwater pipes are used to transfer the rain and snow water from roof of the buildings. Polyvinyl chloride (PVC) is kind of useful plastics in construction and buildings. By adding lubricants, this material will become softer and more flexible than plastics. If no lubricant and plasticizer is added, UPVC is obtained. Chemical resistance of this polymer make it interesting for a variety of industries especially pipe industry. Usage of UPVC includes sewer pipelines, water mains and potable water services, power and telecommunication cables. These pipes are supposed to have chemical and corrosion resistance, high elasticity module and toughness, long term tensile strength and abrasion resistance, but they may become brittle exposed to cold atmosphere. In addition, they tend to deform and lose their strength in high temperature conditions. These pipes have been given better properties by addition of nanoparticles.



## Application

- Particularly for rainwater pipes



### **Advantage of Using Nanotechnology**

Addition of nanoparticles significantly improves both the toughness and stiffness of UPVC, while having little effect on the tensile strength. The evaluation of impact property was performed according to ISIRI 9119. ISIRI 9119: plastics-Unplasticized poly (vinyl chloride) (PVC-U) pipe, fittings and piping system for soil and waste discharge within building structure- specifications



### **Certificates and Standards**

- NanoScale Certification

### **About Company**

Name of Company	Pishgam Plast Ahvaz
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# UPVC Sewer Pipes



## Introduction

Nowadays, the most of sewage pipes are made of UPVC. Polyvinyl chloride (PVC) is one of the most widely used plastics in construction and buildings which has various applications. Addition of lubricants makes this material softer and more flexible than plastics. If no lubricants or plasticizers are added to it, the resulting material is known as UPVC. The chemical resistance of this polymer has made it suitable for wide applications in different industries, especially the pipe industry. These pipes are supposed to have chemical and corrosion resistance, high elasticity modulus and flexibility, long-term tensile strength, high strength to weight ratio and wear resistance. However, it should be noted that these pipes can be fragile when exposed to cold weather. Besides, they can be deformed and lose their strength because of high temperature. Addition of appropriate nanoparticles can obviate these deficiencies and improve their properties.



## Application

- Particularly for sewage pipes



### **Advantage of Using Nanotechnology**

Addition of nanoparticles significantly improves both the toughness and stiffness of UPVC, while having little effect on the tensile strength. The evaluation of impact property was performed according to ISIRI 9119. ISIRI 9119: plastics-Unplasticized poly (vinyl chloride) (PVC-U) pipe, fittings and piping system for soil and waste discharge within building structure- specifications



### **Certificates and Standards**

- NanoScale Certification

### **About Company**

<b>Name of Company</b>	Pishgam Plast Ahvaz
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<b>Email</b>	<a href="mailto:info@pishgamplast.com">info@pishgamplast.com</a>



# UPVC Water supply Pipe



## Introduction

Water pipes are mainly used for water supply, sewage and drainage applications. These pipes are made of polyvinyl chloride (PVC) which widely used in buildings. Addition of lubricants makes this material softer and more flexible than plastics. If no lubricants or plasticizers are added to it, the resulting material is known as UPVC. The chemical resistance of this polymer has made it suitable for wide applications in different industries, especially the pipe industry. These pipes are supposed to have chemical and corrosion resistance, high elasticity modulus and flexibility, long-term tensile strength, high strength to weight ratio and wear resistance. However, it should be noted that these pipes can be fragile when exposed to cold weather. Besides, they can be deformed and lose their strength because of high temperature. Addition of appropriate nanoparticles can obviate these deficiencies and improve their properties.



## Application

- Particularly for water supply pipes



### Advantage of Using Nanotechnology

Addition of nanoparticles significantly improves both the toughness and stiffness of UPVC, while having little effect on the tensile strength. The evaluation of impact property was performed according to ISIRI 9119. ISIRI 9119: plastics-Unplasticized poly (vinyl chloride) (PVC-U) pipe, fittings and piping system for soil and waste discharge within building structure- specifications



### Certificates and Standards

- NanoScale Certification

### About Company

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# Hard UPVC Fittings



## Introduction

Hard polyvinyl chloride (UPVC) is used to produce a wide range of plastic pipes and fittings. This material is remarkably resistant to chemical erosion and has a smooth interior surface which improves water flow. UPVC has high chemical resistance across its working temperature range, with a wide range of operating pressures. Due to some features including long-term strength, high stiffness and affordability, UPVC systems are widely used in plastic fittings and pipes. It has been demonstrated that the addition of nanoparticles significantly improves the strength and stiffness of UPVC.



## Application

- Particularly for water supply pipes



### Advantage of Using Nanotechnology

Addition of nanoparticles significantly improves the strength and stiffness of UPVC. The evaluation of impact property was performed according to ISIRI 9119.

ISIRI 9119: plastics-Unplasticized poly (vinyl chloride) (PVC-U) pipe, fittings and piping system for soil and waste discharge within building structure- specifications



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Polymer Yas Golpayegan
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# UPVC Door and Window Profilez

## Introduction



Polyvinyl chloride (PVC) is the third most common synthetic polymer after polyethylene (PE) and polypropylene (PP). PVC is a lightweight plastic that is used in the construction. Addition of lubricants makes this material softer and more flexible than plastics. If no lubricants or plasticizers are added to it, the resulting material is known as UPVC (unplasticized polyvinyl chloride). Some particles larger than one nanometer are often added to the PVC in order to reduce the price, but these particles reduce tensile strength and impact resistance; But it has been proven that the addition of nanoparticles significantly improves both the toughness and stiffness of PVC.

## Application



- UPVC is used in dentistry, pipe construction, in cabling as insulation and many other applications. It is commonly used in the building and construction, mostly for window frames, etc.



### Advantage of Using Nanotechnology

Addition of nanopowders significantly improves both the toughness and stiffness of PVC, while having little effect on the tensile strength.



### Certificates and Standards

- NanoScale Certification
- Iran Standard Certification

### About Company

Name of Company	Shahin Saze Fajr
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Tania Ceram



# Antibacterial Ceramic



## Introduction

Ceramics due to having excellent chemical stability, as well as good appearance are widely used in different places such as hospitals and buildings. Ceramics, unfortunately, do not have antibacterial effect inherently, and the microorganisms reproduce easily on their surfaces, especially in wet environments. Regarding this, the need for frequent washing and the use of disinfectants is necessary. However, the use of these materials not only causes respiratory problems but also leads to the loss of cement and mortar between the ceramics. Therefore, the use of a ceramic which has inherent antibacterial properties can be effective in solving these problems. Zin oxide nanoparticles have antibacterial effect which can kill many types of bacteria. These nanoparticles penetrate into the cell walls of bacteria and microorganisms and prevent their growth and reproduction. These nanoparticles can be mixed with ceramic glaze as an additive.



## Application

- Hospitals and clinics
- Toilets and bathrooms
- Public centers and buildings
- Swimming pools and sport saloons



### Advantage of Using Nanotechnology

Addition of ZnO nanoparticles as an additive to the tile glaze creates antibacterial effect in the ceramic. Determining the antibacterial activity of this product was carried out by ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces



### Certificates and Standards

○ NanoScale Certification

### About Company

Name of Company	Tania Ceram
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Tania Ceram



# Antibacterial Tile



## Introduction

Tiles due to having excellent chemical stability, as well as good appearance are widely used in different places such as hospitals and buildings. Tiles, unfortunately, do not have antibacterial effect inherently, and the microorganisms reproduce easily on their surfaces, especially in wet environments. Regarding this, the need for frequent washing and the use of disinfectants is necessary. However, the use of these materials not only causes respiratory problems but also leads to the loss of cement and mortar between the ceramics. Therefore, the use of a tile which has inherent antibacterial properties can be effective in solving these problems. Zinc oxide nanoparticles have antibacterial effect which can kill many types of bacteria. These nanoparticles penetrate into the cell walls of bacteria and microorganisms and prevent their growth and reproduction. These nanoparticles can be mixed with tile glaze as an additive.

### Application

- Hospitals and clinics
- Toilets and bathrooms
- Public centers and buildings
- Swimming pools and sport saloons

### Advantage of Using Nanotechnology

Addition of ZnO nanoparticles as an additive to the tile glaze creates antibacterial effect in the tile. Determining the antibacterial activity of this product was carried out by ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces

### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Tania Ceram
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# Automotive and Transportation

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- Alumina-Copper Rod
- Spot Welding Electrode Tip
- Submerged Arc Welding Tip
- Radiator Water Coolant Additive
- Olka Motor Oil
- Automobile Air Filter containing Polymeric Nanofibers
- Heavy Truck Air Filter
- Automobile Air Filter containing Polyacrylonitrile Nanofibers (nano pordo)
- Vehicle Body Washing Solution Without Water
- Vehicle Engine Washing Solution Without Water
- Car Fan Tray
- Motor Oil containing Ceramic Nanoparticles
- Dashboard Cleaner based on Oil-in-Water Nanoemulsion
- Tire Cleaner based on Oil in Water Nanoemulsion
- Vehicle Body Cleaner based on Oil-in-Water Nanoemulsion
- Vehicle Engine Cleaner based on Oil-in-Water Nanoemulsion
- Glass Waterproofing Solution (NANOIDENT)
- Heavy Vehicle Side Mirror



# Alumina-Copper Rod



## Introduction

This product is made of a nanocomposite consists of copper alloy reinforced with aluminum oxide nanoparticles with the average size of 10 nm, which are uniformly distributed in the copper matrix. Aluminum oxide is produced through a process in which oxygen reacts with aluminum in the copper lattice in the solid state. Aluminum oxide is very hard, thermally stable and insoluble in copper. These particles not only increase the copper alloy strength but also have no significant effect on reducing the thermal and electrical conductivity of copper.



## Application

- Production of resistance welding electrodes
- Submerged arc welding tips
- CO<sub>2</sub> welding tips



## Advantage of Using Nanotechnology

Addition of aluminum oxide nanoparticles increases the hardness and tensile properties of the copper alloy. These features are created through the pinning of dislocations by aluminum oxide nanoparticles, which consequently postpone the crystallization process.



## Certificates and Standards

- NanoScale Certification

## About Company

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# Spot Welding Electrode Tip



## Introduction

This product is made of a nanocomposite consists of copper alloy reinforced with aluminum oxide nanoparticles with the average size of 10 nm, which are uniformly distributed in the copper matrix. Aluminum oxide is produced through a process in which oxygen reacts with aluminum in the copper lattice in the solid state. This method, in comparison with other techniques, has the best particle size and distribution. Aluminum oxide is very hard, thermally stable and insoluble in copper. These particles not only increase the copper alloy strength but also have no significant effect on reducing the thermal and electrical conductivity of copper. The electrode tips are produced in different male or female types by cold forming process or in some cases by the machining process.



## Application

- Assembly of the car body (robotic and manual)
- Home appliances
- Aerospace industries (welding)



### Advantage of Using Nanotechnology

Addition of aluminum oxide nanoparticles increases the hardness and tensile properties of the copper alloy. These features are created through the pinning of dislocations by aluminum oxide nanoparticles, which consequently postpone the crystallization process.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Artash Composite
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# Submerged Arc Welding Tip



## Introduction

The uniform distribution of aluminum oxide nanoparticles has made this nanocomposite an appropriate choice for use in severe conditions. In case of need to high conductivity and wear resistance, especially at high temperatures, this nanocomposite shows a remarkable performance. For instance, contact tips in submerged arc welding should have a high thermal conductivity, wear resistance and structural stability at high temperature. ARTRODE fulfills all of these requirements and can be an excellent alternative for the well-established alloys such as Beryllium-Copper or Chromium-Zirconium-Copper.



## Application

- Heavy welding and pipe manufacturing industries



### Advantage of Using Nanotechnology

Addition of aluminum oxide nanoparticles increases the hardness and tensile properties of the copper alloy. Furthermore, due to the uniform distribution of aluminum oxide nanoparticles, this nanocomposite also shows high conductivity and wear resistance.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Artash Composite
Website	<a href="http://www.artashcomposite.com">www.artashcomposite.com</a>
Email	<a href="mailto:info@artashcomposite.com">info@artashcomposite.com</a>



# Radiator Water Coolant Additive



## Introduction

More efficient heat transfer systems are increasingly preferred because of the accelerating miniaturization, on the one hand, and the ever-increasing heat flux, on the other hand. The poor heat transfer properties of the common fluids like water compared to most solids is a primary obstacle to the high compactness and effectiveness of heat exchangers. Passive enhancement methods such as enhanced surfaces are often employed in thermo-fluid systems. Therefore, the development of advanced heat transfer fluids with higher thermal conductivity and improved heat transfer is in strong demand. Nanofluids are heat transfer liquids with dispersed nanoparticles. The effectiveness of heat transfer enhancement has been found to be dependent on the amount of dispersed particle, material type, particle shape, etc.



### Application

- Diesel generators
- Mining, agricultural and industrial machinery



### Advantage of Using Nanotechnology

This product is a nanofluid containing nanoparticles. The nanoparticles used in nanofluids are typically made of metals, oxides, carbides, or carbon nanotubes. Addition of this nanofluid to the solution inside the radiator increases the heat transfer rate by 15%.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Avijeh Company
Website	<a href="http://www.nanosavco.ir">www.nanosavco.ir</a>
Email	info@nanosavco.ir



# Olka Motor Oil



## Introduction

Depreciation of the automobile engine because of the increase in temperature and friction is the main challenge in the automobile industry. In this regard, improving the quality of motor oils has always been the main concern of the specialists. Motor oils containing nano additives are the latest technology for protecting and extending the life of automotive engine and oil through mechanical means instead of chemicals, which can deteriorate over time. The nanometer-sized diamonds suspended in the motor oil are completely dispersed in the oil and fill the pores of the metal, helping to sustain an oil film on the inner surfaces of the engine. The nanodiamond ball bearings transform the sliding friction that normally occurs between metal surfaces into rolling friction, thereby reducing heat, wear and engine drag. Lower heat helps to extend the life of the oil, and less engine drag increases fuel mileage.



## Application

- As a lubricant used in internal combustion engines, which power cars, motorcycles, etc.



### Advantage of Using Nanotechnology

The nanometer-sized diamonds fill the pores of the metal, helping to sustain an oil film on the inner surfaces of the engine and sealing out the debris and moisture that cause corrosion. The nanodiamond ball bearings transform the sliding friction into rolling friction, thereby reducing heat, wear and engine drag.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Bakhtar Pardis Chemistry
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Email	info@psb-oil.com



Behran Filter



# Automobile Air Filter containing Polymeric Nanofibers



## Introduction

The automobile air filter is used to protect the engine and prevent damage to the motor components by dust, contaminants and other harmful suspended particles in the air. The latest evolution in the filtration industry is the use of nanotechnology in this field. With this technique, the surface of large cellulosic or synthetic nanofibers (usually 10 to 30 micrometers in diameter) is covered with a layer of ultra-fine nanofibers (typically 50 to 400 nm in diameter). There are two different methods for separating particles in the filter paper structure.

In-depth filtration, in which particles are separated in different layers of paper according to their size; and surface filtration, in which all particles are separated on the surface of paper. In Behran Co. before the pleating process, the filter paper is covered with a layer of Polyamide textiles with the diameter of less than 100 nanometers by using electrospinning process.



### Application

- This product is mainly used as automobile air filter



### Advantage of Using Nanotechnology

Nanofibers because of having a high surface area, high length to width ratio, and low density are able to eliminate the large amounts of particles during the filtration process; this performance leads to an increase in filtration efficiency. The filtration efficiency was evaluated in accordance with EN 779.

EN 779: Classification of particulate air filters



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Behran Filter
Website	<a href="http://www.behranfilter.com">www.behranfilter.com</a>
Email	<a href="mailto:technical@behranfilter.com">technical@behranfilter.com</a>



# Heavy Truck Air Filter



## Introduction

The latest evolution in the filtration industry is the use of nanotechnology in this field. With this technique, the surface of large cellulosic or synthetic fibers (usually 10 to 30 micrometers in diameter) is covered with a layer of ultra-fine nanofibers (typically 50 to 400 nanometers in diameter). In this method, before the pleating process, the filter paper is covered with a layer of polymeric nanofibers with diameter of 50 to 300 nanometer by using an electric field. Nanofibers form because of the existence of a large potential difference.



## Application

- This product is mainly used as heavy truck air filter



### Advantage of Using Nanotechnology

Nanofibers because of having a high surface area, high length to width ratio, and low density are able to eliminate the large amounts of particles during the filtration process; this performance leads to an increase in filtration efficiency.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Behran Filter
Website	<a href="http://www.behranfilter.com">www.behranfilter.com</a>
Email	<a href="mailto:technical@behranfilter.com">technical@behranfilter.com</a>



Nano Sakhtar Mehr Asa



# Automobile Air Nano Filter (nano pordo)



## Introduction

A particulate air filter is a device composed of fibrous materials which removes solid particulates such as dust, pollen, mold, and bacteria from the air. Polyacrylonitrile (PAN) is a versatile polymer used to produce large variety of products including ultra-filtration membranes, hollow fibers for reverse osmosis, fibers for textiles, oxidized PAN fibers. Nanofibers with smaller thickness and higher surface area than that of regular fibers, have enormous applications in filtration. To do it, electrospinning is one of the most attractive and effective processes in the production of continuous nanofibers from synthetic and natural polymers.



### Application

- Cabin air Filter
- Engine Air Filter



### Advantage of Using Nanotechnology

Nanofibers have high surface area, high length to width ratio, and low density therefore they are able to filter the large amounts of particles during the filtration process; i.e. higher filtration efficiency. The filtration efficiency was evaluated in accordance with EN 779.

EN 779: Classification of particulate air filters



### Certificates and Standards

- NanoScale Certification

## About Company

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# Vehicle Body Washing Solution Without Water

## Introduction



We all enjoy the feeling of driving a freshly washed car. The cleanliness of the vehicles we drive says a lot about the type of person we are. It's no different than how we care for our houses, our landscaping, or our personal appearances. Beautifully prepared cars project confidence, professionalism, and just makes us feel good when driving (or admiring) them! And the act of car washing can be therapeutic and relaxing as well. It depends on that wash your car by yourself or give it to a carwash and spend money. But if you want to wash your car by yourself, at first you should find an appropriate detergent. This product is a water-based cleaner that cleans the vehicle body by using nanoparticles and does not require water. the product is relying on the anti-static properties which prevent dust accumulation on the surface of the car.



### Application

- Particularly for washing the body of automobiles and heavy trucks



### Advantage of Using Nanotechnology

It should be noted that all of these properties are due to the use of nanotechnology because nanoparticles compared with micron-sized particles show enhanced properties.



### Certificates and Standards

- NanoScale Certification
- Health approval of Food and Drug Administration

## About Company

Name of Company	Kimia Chemie Sahand
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# Vehicle Engine Washing Solution Without Water



## Introduction

Like other parts of a car, an engine works better when it is clean; but cleaning the engine is not the same as washing other parts of the car. Having a clean and dry engine encourage us to wash it sometimes with water. However, the key problem is that modern vehicles have many electronic components such as the electronic control unit, fuse box, switches and many other connections, which none of them should be in contact with water. Therefore, changing the way the engine is cleaned is inevitable. This product is a water-based cleaner that cleans the engine by using nanoparticles and does not require water. The product is relying on the anti-static properties which prevent dust accumulation on the surface of the engine.



### Application

- Particularly for washing the engine of automobiles and heavy trucks



### Advantage of Using Nanotechnology

It should be noted that all of these properties are due to the use of nanotechnology, because nanoparticles compared with micron-sized particles show enhanced properties.



### Certificates and Standards

- NanoScale Certification
- Health approval of Food and Drug Administration

## About Company

Name of Company	Kimia Chemie Sahand
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# Car Fan Tray



## Introduction

Thermoplastics and thermosets are two separate classes of polymers, which are differentiated based on their response to heat; thermoplastics can be remelted, while thermoset plastics remain in a permanent solid state once hardened. As a result of these physical qualities, thermoplastic materials have low melting points while thermoset products can withstand high temperatures without losing austerity. Because polypropylene (PP) is low in cost but has outstanding mechanical properties and formability, it accounts for more than half of all the plastic materials used in automobiles. The growth of PP compounds for automotive applications has thus far been supported by the improved performance of PP resins. Inorganic fillers such as calcium carbonate are added to improve the performance of PP.



## Advantage of Using Nanotechnology

Addition of nanoparticles to a polymer matrix improves the interaction strength between the matrix and reinforcements, which can increase the mechanical properties. Addition of nanoparticles to this product results in higher impact resistance associated with higher elastic modulus.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Mehrsaz Gostar Pars
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Email	<a href="mailto:info@mehrsaz.net">info@mehrsaz.net</a>



# Motor Oil containing Ceramic Nanoparticles

## Introduction



For the purpose of preventing wear, reducing friction, and high-temperature load-bearing, Lubricants used in a variety of fields such as transport equipment, turbines, compressors and oil equipment. Currently, lubricants are mainly used in diesel, gasoline and natural gas engines. In recent years, the use of additives containing sulfur and phosphorus in production of motor oils has been associated with environmental problems. Recently, by considering the use of nanotechnology in different industries, nano additives for engine oils have been developed. Nanomaterials as oil additives can reduce torque, engine friction coefficient and wear. which result in decreasing fuel consumption, improving performance, and extending the engine life. Moreover, nanomaterials by entering the surface cavities can repair or fill the pores.



### Application

- Internal combustion engines, power cars, motorcycles, etc.
- Transmission, Brake and hydraulic oil



### Advantage of Using Nanotechnology

Nanoparticles in the motor oil play slippery role between the two surfaces, or fill in the surface cracks and pores. They can also create a protective layer on the surface or reduce the abrasive effects of particles.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Nano Ravankar Iranian
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Email	<a href="mailto:info@nanoyuz.com">info@nanoyuz.com</a>



# Dashboard Cleaner based on Nanoemulsion



## Introduction

An emulsion is a mixture of two or more liquids that are normally unmixable. Emulsions tend to have a cloudy appearance because many phase interfaces scatter light as it passes through the emulsion. Two special classes of emulsions – microemulsions and nanoemulsions appear translucent. Nanoemulsions are emulsions with droplet size on the order of 100 nm. A typical nanoemulsion contains oil, water and an emulsifier. Since microemulsions are thermodynamically stable systems in equilibrium, they are sensitive to changes in temperature and composition. Therefore, nanoemulsions are attractive for aforementioned applications because they are relatively the least sensitive to physical and chemical changes and they can be kinetically stable over long time scales. The above-mentioned product is an oil-in-water nanoemulsion which is used as a detergent for cleaning and polishing a variety of surfaces.



### Application

- Mainly used for polishing and cleaning of automobile interior surfaces like dashboard



### Advantage of Using Nanotechnology

Nanoemulsions have a higher specific surface area and free energy compared with microemulsions which make them an effective transport system. Nanoemulsions do not face with the problems such as flocculation, coagulation and sedimentation which are commonly seen in microemulsions.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Setareh Taban Pak
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Email	<a href="mailto:info@msk-el.com">info@msk-el.com</a>



# Tire Cleaner based on Nanoemulsion

## Introduction



An emulsion is a mixture of two or more liquids that are normally unmixable. Emulsions tend to have a cloudy appearance because many phase interfaces scatter light as it passes through the emulsion. Two special classes of emulsions – microemulsions and nanoemulsions appear translucent. Nanoemulsions are emulsions with droplet size on the order of 100 nm. A typical nanoemulsion contains oil, water and an emulsifier. Since microemulsions are thermodynamically stable systems in equilibrium, they are sensitive to changes in temperature and composition. Therefore, nanoemulsions are attractive for aforementioned applications because they are relatively the least sensitive to physical and chemical changes and they can be kinetically stable over long time scales. The above-mentioned product is an oil-in-water nanoemulsion which is used as a detergent for cleaning and polishing a variety of surfaces.



### Application

- Mainly used for polishing and cleaning of tires



### Advantage of Using Nanotechnology

Nanoemulsions have a higher specific surface area and free energy compared with microemulsions which make them an effective transport system. Nanoemulsions do not face with the problems such as flocculation, coagulation and sedimentation which are commonly seen in microemulsions.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Setareh Taban Pak
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# Vehicle Body Cleaner based on Nanoemulsion



## Introduction

An emulsion is a mixture of two or more liquids that are normally unmixable. Emulsions tend to have a cloudy appearance because many phase interfaces scatter light as it passes through the emulsion. Two special classes of emulsions – microemulsions and nanoemulsions appear translucent. Nanoemulsions are emulsions with droplet size on the order of 100 nm. A typical nanoemulsion contains oil, water and an emulsifier. Since microemulsions are thermodynamically stable systems in equilibrium, they are sensitive to changes in temperature and composition. Therefore, nanoemulsions are attractive for aforementioned applications because they are relatively the least sensitive to physical and chemical changes and they can be kinetically stable over long time scales. The above-mentioned product is an oil-in-water nanoemulsion which is used as a detergent for cleaning and polishing a variety of surfaces.



### Application

- Mainly used for polishing and cleaning of automobile body



### Advantage of Using Nanotechnology

Nanoemulsions have a higher specific surface area and free energy compared with microemulsions which make them an effective transport system. Nanoemulsions do not face with the problems such as flocculation, coagulation and sedimentation which are commonly seen in microemulsions.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Setareh Taban Pak
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# Vehicle Engine Cleaner based on Nanoemulsion



## Introduction

cleaning the engine is not same as cleaning other parts of the car. Having a clean and dry engine encourage us to clean it sometimes with water. However, the key problem is that modern vehicles have many electronic components such as electronic control unit, fuse box, switches and many other connections, which none of them should be in contact with water. Therefore, changing the way the engine is cleaned is inevitable. The above-mentioned product is an oil-in-water nanoemulsion which is used as a detergent for cleaning and polishing a variety of surfaces. This product relying on the anti-static properties prevents dust accumulation on the surface of the engine.



### Application

- >Mainly used for polishing and cleaning of some parts of automobile such as motor, dashboard, body, and tires



### Advantage of Using Nanotechnology

Nanoemulsions have a higher specific surface area and free energy compared with microemulsions which make them an effective transport system. Nanoemulsions do not face with the problems such as flocculation, coagulation and sedimentation which are commonly seen in microemulsions.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Setareh Taban Pak
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# Heavy Vehicle Side Mirror



## Introduction

Optical mirrors are designed to reflect light in a variety of applications such as light steering, interferometry, imaging, and general applications. These mirrors are widely used in the various industries, especially in the automotive industry. In conventional mirrors, the unwanted light scattering has negative effects on the efficiency and product performance, as far as it reduces the visibility. Nanocoating technology improves the performance of these mirrors, in a way that is minimizing the light scattering.



## Application

- As side mirror in heavy vehicle



### Advantage of Using Nanotechnology

Nanocoatings prevent light scattering because of having thicknesses less than the wavelength of visible light. The coating thickness in this product is less than 100 nm, which causes 5% reduction in light reflection and shows strong adhesion to the surface. Adhesion properties of the coating was evaluated by MIL-C-675 standard.

MIL-C-675: Coating of Glass Optical Elements (Anti - Reflection)



### Certificates and Standards

○ NanoScale Certification

### About Company

Name of Company	Orang Sanat Sepahan
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# Energy, Petroleum and Related Industries

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- Gas Turbine Air Filter
- Turbine Inlet Air Filter
- Nanofluid Coolant for Power Plant
- Radiant Heater containing Catalytic Nanoparticles
- Naphtha Reforming Nanocatalyst for CCR unit
- Heat Sink with Alumina Nanoporous Coating
- Desulfurization Catalyst containing Zinc Oxide Nanoparticles
- Turbine Inlet Air Filter
- Bag Filter containing Polymer Nanofiber
- Dehydrogenation Nanocatalyst
- Desulfurization Nanocatalyst
- Oxychlorination Nanocatalyst
- Refractory Castable
- NACOL Suspension
- Emulsified Fuel



Behran Filter



# Gas Turbine Air Filter

## Introduction



Proper air filtration is critical to the overall performance and reliability of gas turbines. The latest evolution in the filtration industry is the use of nanotechnology in this field. With this technique, the surface of large cellulosic or synthetic textiles (usually 10 to 30 micrometers in diameter) is covered with a layer of ultra-fine textiles (typically 50 to 400 nanometers in diameter). There are two different methods for separating particles in the filter paper structure.

In-depth filtration, in which particles are separated in different layers of paper according to their size; and surface filtration, in which all particles are separated on the surface of paper. In Behran Co. before pleating process, the filter paper is covered with a layer of Polyamide textiles with diameter of less than 100 nanometer by using electrospinning process.

## Application



- The main application of this technology is in air filtration of gas turbines with reverse pulse cleaning system



### Advantage of Using Nanotechnology

Electrospinning is used to improve the performance and efficiency of the filter. This technology while increases the efficiency of dust absorption, avoid high pressure drop. Fibers produced by electrospinning have a diameter of less than 100 nm and cover the surface of the filter paper uniformly. The filtration efficiency was evaluated in accordance with EN 779. EN 779: Classification of particulate air filters



### Certificates and Standards

○ NanoScale Certification

### About Company

Name of Company	Behran Filter
Website	<a href="http://www.behranfilter.com">www.behranfilter.com</a>
Email	<a href="mailto:technical@behranfilter.com">technical@behranfilter.com</a>



# Turbine Inlet Air Filter

## Introduction



Air filters are used to prevent damage to power plant equipment through dust particles, contaminants and other harmful particles in the air. The main goal is the maximum absorption of dust particles from the air. Nano-fibers with lower thickness and higher specific surface area than that of conventional fibers have many applications in filtration and electrospinning is the most efficient process for production of continuous fibers from synthetic or natural polymers. Electrospinning is used to improve the performance and efficiency of the filter. This technology while increases the efficiency of dust absorption, avoid high pressure drop. Fibers produced by electrospinning have a diameter of less than 100 nm and cover the surface of the filter paper uniformly.

## Application

- Mainly for filtration of turbine inlet air



### Advantage of Using Nanotechnology

Nanofibers because of having high surface area, high length to width ratio, and low density are able to eliminate the large amounts of particles during the filtration process; this performance leads to an increase in filtration efficiency.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Azad Filter
Website	<a href="http://www.azadfilter.ir">www.azadfilter.ir</a>
Email	info@azadfilter.ir



# Nanofluid Coolant for Power Plant

## Introduction



More efficient heat transfer systems are increasingly preferred because of the accelerating miniaturization, on the one hand, and the ever-increasing heat flux, on the other hand. The poor heat transfer properties of the common fluids like water compared to most solids is a primary obstacle to the high compactness and effectiveness of heat exchangers. Passive enhancement methods such as enhanced surfaces are often employed in thermo-fluid systems. Therefore, the development of advanced heat transfer fluids with higher thermal conductivity and improved heat transfer is in strong demand. Nanofluids are heat transfer liquids with dispersed nanoparticles. The effectiveness of heat transfer enhancement has been found to be dependent on the amount of dispersed particle, material type, particle shape, etc.

## Application

- All heating and cooling exchangers
- Diesel generators
- Mining, agricultural and industrial machinery



### Advantage of Using Nanotechnology

This product is a nanofluid containing nanoparticles. The nanoparticles used in nanofluids are typically made of metals, oxides, carbides, or carbon nanotubes. Addition of this nanofluid to the solution inside the radiator increases the heat transfer rate by 15%.

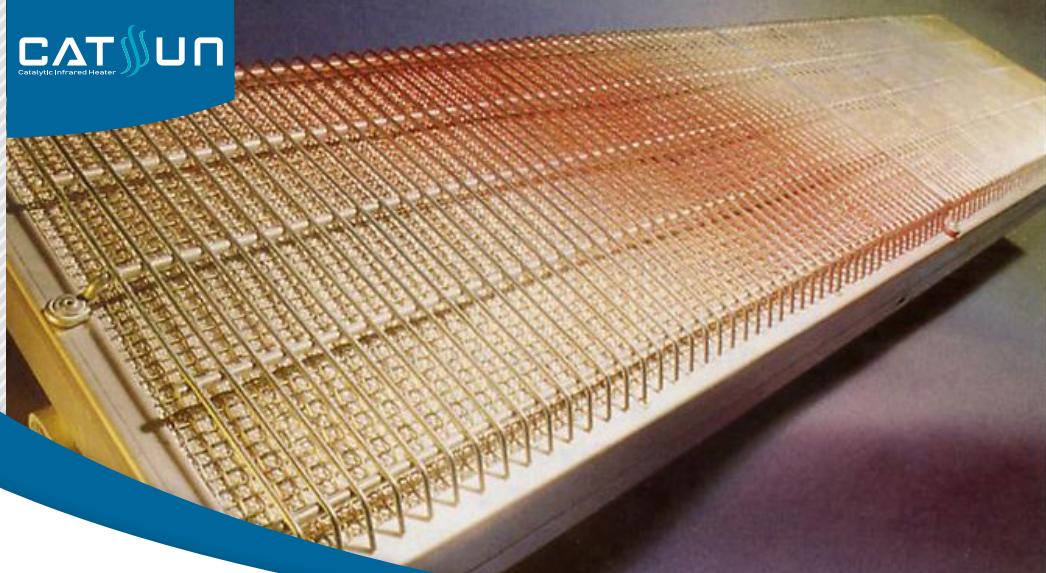


### Certificates and Standards

- NanoScale Certification

### About Company

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# Radiant Heater containing Catalytic Nanoparticles



## Introduction

The use of furnaces in the industry encounters with many problems, including emission of pollutant gases, increase in the time required to reach the sufficient accuracy for heating, and nonuniform heat-distribution. In this product, a layer containing catalytic nanoparticles is applied onto the alumina base. Using a catalyst in combustion reaction makes it possible to ignite the flammable mixture of fuel and air without flame, by using a considerable amount of radiation flux from the hot surfaces of the catalyst. The catalytic radiation layer is embedded inside the heater panel. The insulation layers, on one hand, prevent heat dissipation from the back of the panel and, on the other hand, distribute the fuel on the catalytic layer. To start the combustion reaction in the presence of a catalyst, the catalyst is preheated and the combustion reaction begins at a low temperature without need to flame formation.



### Application

- Thermo-forming (deformation by heat)
- Preheating of textile products
- Heating of industrial environments
- Drying insulating paint on electric cables



### Advantage of Using Nanotechnology

Since the main factor that controls the radiant panels capacity is the penetration of oxygen into the porous structure of the catalytic layer, by reducing the size of the catalyst particles to the nanometer range, the surface area-to-volume ratio increases; consequently, the free surface of the catalyst for exposure to oxygen and combustion enhances.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Behfaravar Novin Aria Sarmad
Website	<a href="http://www.bnasco.com">www.bnasco.com</a>



# Naphtha Reforming Nanocatalyst for CCR unit



## Introduction

Catalytic reforming is a major conversion process in petroleum refinery which converts low octane naphthas into higher octane reformate products for gasoline blending and aromatic rich reformate for aromatic production. To perform the process correctly and efficiently, as well as to prevent coke making, the process structure and catalyst must be selected optimally. The efficient structure of the reforming reactors is continues catalytic reforming (CCR). In this process the catalyst is key component. The  $\gamma$ -alumina based catalyst is amongst the catalysts that has a long history in catalytic reforming. In naphtha reforming,  $\gamma$ -alumina is responsible for acidic interactions; moreover, the dehydrogenation reactions are performed by some metals which are impregnated to the catalyst. Therefore, alumina-based catalyst is a very suitable candidate for catalytic reforming.



### Application

- Production of high-octane components which are premium blending stocks for high-octane gasoline, and the main source of aromatic bulk chemicals such as benzene, toluene



### Advantage of Using Nanotechnology

Nanoporous alumina has a large specific surface area which facilitates reactions. Furthermore, the catalyst is impregnated with nanoparticles which create more available surface for reforming reactions.

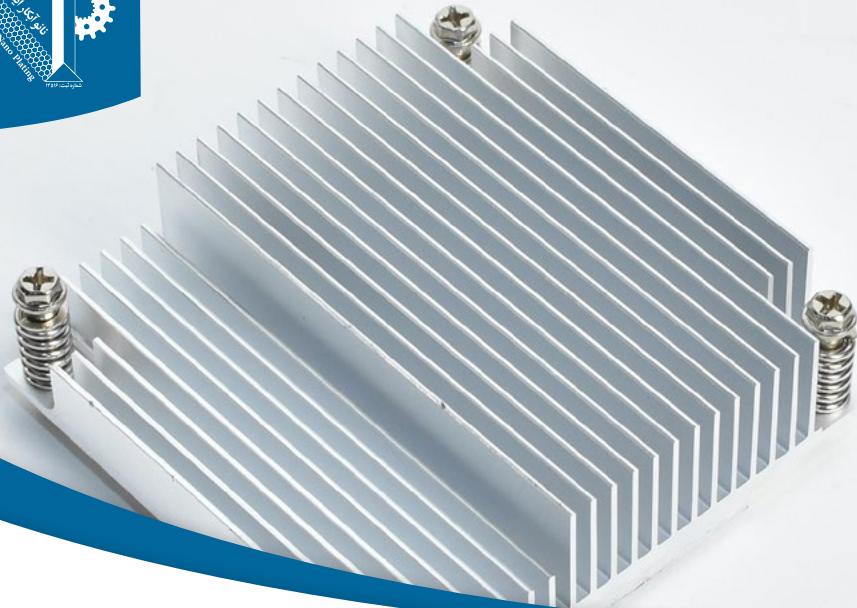


### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	ILYA Science and Technology Development Co.
Website	<a href="http://www.ilya-corp.com">www.ilya-corp.com</a>
Email	<a href="mailto:info@ilya-corp.com">info@ilya-corp.com</a>



# Heat Sink with Alumina Nanoporous Coating



## Introduction

A heat sink is a passive heat exchanger that transfers the heat generated by an electronic or a mechanical device to a fluid medium, often air or a liquid coolant, where it is dissipated away from the device, thereby allowing regulation of the device's temperature at optimal levels. A heat sink is usually made out of copper or aluminum. To increase the corrosion resistance of the heat sink the surface of heat sink is usually coated with a corrosion-resistant material. Anodizing is an electrochemical process that converts the metal surface into a decorative, durable, corrosion-resistant, anodic oxide finish. Concerning this product, by using anodizing process a layer of nanoporous alumina is deposited onto the surface of the heat sink to improve its corrosion resistance.



### Application

- In computers, heat sinks are used to cool central processing units or graphics processors
- In high-power semiconductor devices such as power transistors and optoelectronics such as lasers and light emitting diodes (LEDs)



### Advantage of Using Nanotechnology

This product is coated with a nanoporous alumina layer. The large surface area-to-volume ratio of nanoscale pores improves heat transfer.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Isatis Nano Plating
Website	<a href="http://www.inp-coating.com">www.inp-coating.com</a>
Email	Hodanasirizade@yahoo.com



# Desulfurization Catalyst containing Zinc Oxide Nanoparticles



## Introduction

Sulfur compounds are one of the main pollutants of the air and chemical processes which damage human health, water resources, catalysts and other devices. Removing sulfur compounds is one of the main processes in fossil fuel applications. Various inorganic sorbents are used to remove H<sub>2</sub>S in such applications. Among sorbents, zinc oxide is one of the most important sorbents for removal of H<sub>2</sub>S at moderate temperatures. This advantage is due to the fact that the thermodynamics of the ZnO-H<sub>2</sub>S reaction is more favorable than other desulfurizing sorbents and also has a higher sulfur absorption capability. Nanotechnology, relying on its unique features, has improved the performance and properties of the products.



## Application

- In catalytic desulfurization process



### Advantage of Using Nanotechnology

Nanoparticles and nanostructured sorbents due to their large surface area-to-volume ratio, increase desulphurization rate.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Kharazmi Technology Development
Website	<a href="http://www.kharazmi-rt.com">www.kharazmi-rt.com</a>
Email	<a href="mailto:info@kharazmi-rt.com">info@kharazmi-rt.com</a>



# Turbine Inlet Air Filter

## Introduction



Air filters are used to prevent damage to power plant equipment through dust particles, contaminants and other harmful particles in the air. The main goal is the maximum absorption of dust particles from the air. Nano-fibers with lower thickness and higher specific surface area than that of conventional fibers have many applications in filtration and electrospinning is the most efficient process for production of continuous fibers from synthetic or natural polymers. Electrospinning is used to improve the performance and efficiency of the filter. This technology while increases the efficiency of dust absorption, avoid high pressure drop. Fibers produced by electrospinning have a diameter of less than 100 nm and cover the surface of the filter paper uniformly.

## Application

- Mainly for filtration of turbine inlet air



### Advantage of Using Nanotechnology

Nanofibers because of having high surface area, high length to width ratio, and low density are able to eliminate the large amounts of particles during the filtration process; this performance leads to an increase in filtration efficiency. The filtration efficiency was evaluated in accordance with EN 779.

EN 779: Classification of particulate air filters



### Certificates and Standards

○ NanoScale Certification

### About Company

Name of Company	Machine Sazi Andishe Shomal
Website	<a href="http://www.andisheshomal.com">www.andisheshomal.com</a>
Email	<a href="mailto:m.boushehri@mabnaniro.com">m.boushehri@mabnaniro.com</a>



# Bag Filter containing Polymer Nanofiber



## Introduction

A bag filter is an air pollution control device and dust collector that removes particulates out of air or gas released from commercial processes. Power plants, steel mills, pharmaceutical producers, food manufacturers, chemical producers and other industrial companies often use bag filter to control emission of air pollutants. In production of bag filters, polymer nanofibers with large surface area-to-volume ratio, as well as high porosity are used which improve filtration.



## Application

- o



### Advantage of Using Nanotechnology

Nanofibers because of having high surface area, high length to width ratio, and low density are able to eliminate the large amounts of particles during the filtration process; this performance leads to an increase in filtration efficiency.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Nano Fanavaran Khavar
Website	<a href="http://www.nanokhavar.com">www.nanokhavar.com</a>
Email	<a href="mailto:info@nanokhavar.com">info@nanokhavar.com</a>



# Dehydrogenation Nanocatalyst



## Introduction

Dehydrogenation catalysts are widely used in oil, gas and petrochemical industries. For maximum efficiency, these catalysts should have the highest level of catalytic activity; the activity of the catalyst is usually proportional to the surface area of the active phase. Therefore, for having maximum efficiency the active materials should properly distribute in nanopores.



## Application

- Oil and Petrochemical catalysts



### Advantage of Using Nanotechnology

Mesoporous materials have a large surface area-to-volume ratio compared with bulk materials. The large specific surface area of nanopores generated in the catalyst increases the catalytic activity.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Nano Pars Spadana
Website	<a href="http://www.nanops.ir">www.nanops.ir</a>
Email	<a href="mailto:nanopars@gmail.com">nanopars@gmail.com</a>



# Desulfurization Nanocatalyst



## Introduction

Oxides of sulfur and nitrogen are the main air pollutants that are also responsible for acid rain. Excessive sulfur content in petroleum fractions such as naphtha, in addition to causing air pollutants, can corrode tanks, reactors, pipes and fittings. Currently desulfurization is carried out using desulphurization catalysts adjacent to hydrogen; thus at a certain temperature and pressure, as well as a specific proportion of hydrogen, sulfur atoms convert to hydrogen sulfide. Catalysts based on  $\gamma$ -alumina are commonly used for desulphurization. Alumina has various applications including ceramic membranes, paints, refinery and chemical catalysts, pollution control and base catalyst. The mesoporous  $\gamma$ -alumina with pore diameter in the range of 2 to 50 nm due to its high specific surface area, high porosity, good thermal stability and suitable pore distribution is used as the most common base catalyst in desulphurization.



## Application

- Refinery and chemical catalysts
- Pollution control



### Advantage of Using Nanotechnology

Mesoporous materials have a large surface area-to-volume ratio compared with bulk materials. The large specific surface area of nanopores generated in the catalyst increases the catalytic activity.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Nano Pars Spadana
Website	<a href="http://www.nanops.ir">www.nanops.ir</a>
Email	<a href="mailto:nanopars@gmail.com">nanopars@gmail.com</a>



# Oxychlorination Nanocatalyst



## Introduction

The mesoporous  $\gamma$ -alumina catalyst impregnated with  $\text{CuCl}_2$  is used for ethylene dichloride ( $\text{C}_2\text{H}_4\text{Cl}_2$ ) production in the oxychlorination process. The copper-based catalyst is conventionally used in oxychlorination process. The ethylene oxychlorination process consists of three steps: copper chloride reduction, reoxidation by oxygen, and chlorination by  $\text{HCl}$ . The mesoporous  $\gamma$ -alumina with pore diameter in the range of 2 to 50 nm is one of the phases that forms during the alumina production process; due to its high specific surface area, high porosity, good thermal stability and suitable pore distribution,  $\gamma$ -alumina is used as the most common base catalyst in heterogeneous reactions.



## Application

- In petrochemical EDC reactors for conversion of ethylene to ethylene dichloride



### Advantage of Using Nanotechnology

Mesoporous materials have a large surface area-to-volume ratio compared with bulk materials. The large specific surface area of nanopores generated in the catalyst increases the catalytic activity.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Nano Pars Spadana
Website	<a href="http://www.nanops.ir">www.nanops.ir</a>
Email	<a href="mailto:nanopars@gmail.com">nanopars@gmail.com</a>



# Refractory Castable



## Introduction

This product is a refractory castable which can be used as an alternative for other casting materials. The main feature of this product is its cold compressive strength which depending on the alumina content in its formula can withstand temperatures from 1400 °C to 1800 °C. Refractory castables can be classified into conventional, low iron, low cement, and insulating. Each type has its special characteristics and applications. Calcium aluminate cement is the most used hydraulic binder in refractory castables compositions. However, there are many drawbacks. To obviate these drawbacks colloidal silica sols are used as a binder for refractory castable compositions. Colloidal silica is a stable water-based suspensions, containing nanometric spherical amorphous silica particles. When combined with other solid particles, colloidal silica can be linked together in branched chains, in a process known as gelation.



## Application

- Great for common furnace applications, burner blocks, tundishes, etc.



### Advantage of Using Nanotechnology

Addition of silica nanoparticles to this refractory castable improves cold compressive strength.



### Certificates and Standards

○ NanoScale Certification

## About Company

Name of Company	Pat Roshan Nikta
Website	<a href="http://www.patron.group">www.patron.group</a>
Email	info@patron.group



# NACOL Suspension



## Introduction

NACOL is a stable suspension of the amorphous metal oxide nanoparticles in a liquid phase. Depending on the method of production, these particles may also be present in a narrow or wide particle size range.



## Application

- As Enhanced Drilling Fluids in the petroleum and gas industries



### Advantage of Using Nanotechnology

Enhanced Drilling Fluids which are based on nanoparticles not only improve the operation properties but also reduce the operation costs remarkably.

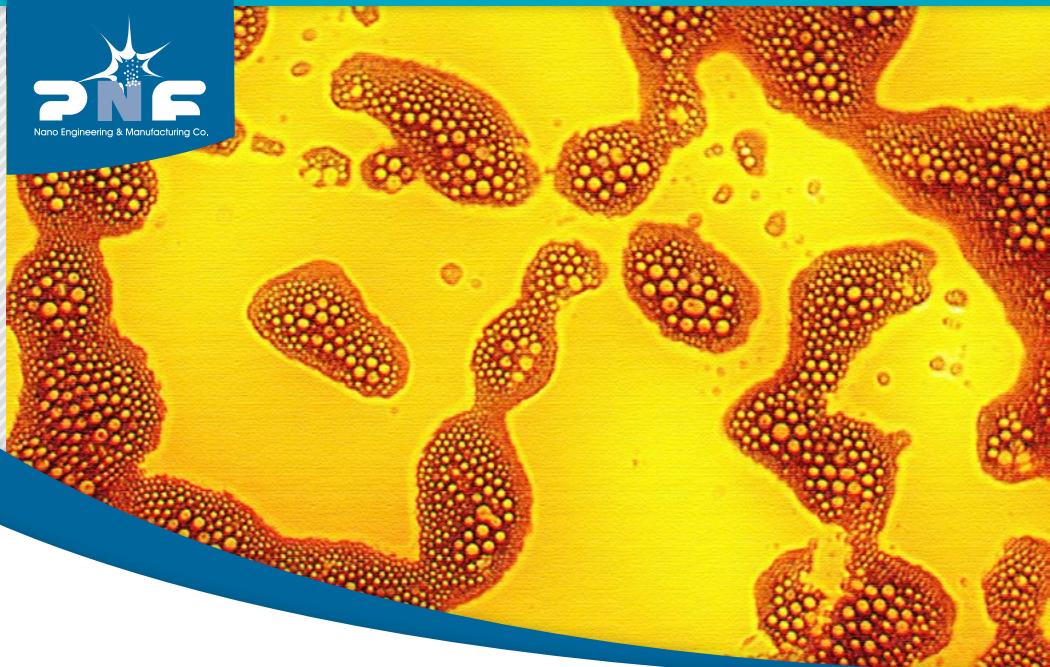


### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Petro Pajouhan Nano Gostar
Website	<a href="http://www.petropng.com">www.petropng.com</a>
Email	<a href="mailto:info@petropng.com">info@petropng.com</a>



# Emulsified Fuel

## Introduction



Hydrodynamic cavitation is achievable by passing a fluid through a constricted zone at sufficient velocity and onsets after the static pressure of the liquid has decreased to the saturated vapor pressure. The significant characteristics of the cavitation are the number of cavities in a flow unit, the surface tension and the size of bubbles, which range from ten nanometers to a few microns or even larger in diameter. The collapse of the bubbles tends to sudden localized pressure and temperature rise. The combination of elevated pressure and temperature, along with vigorous mixing supplied by the hydrodynamic cavitation, triggers and accelerates numerous reactions and processes. Therefore, the unlikely micro and Nano bubbles produced by the past known destructive process may act as miniature reactors.

By applying the cavitation reactors, it is viable to produce highly stable emulsion fuel with no need to expensive surfactant.

## Application

- Marine engines, Locomotives, Power generation, Construction equipment, Industrial boilers, On road purposes such as Public fleets , ...



## Advantage of Using Nanotechnology

### Features:

Improved health and associated costs

Reduced fuel import dependence

Improved fleet efficiency – extent useful machine life

Reduction of environmental risks

Create employment opportunities



## Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	PNF Co.
Website	<a href="http://www.pnf-co.com">www.pnf-co.com</a> <a href="http://www.pnaqua.com">www.pnaqua.com</a>
Email	<a href="mailto:info@pnf-co.com">info@pnf-co.com</a>



# Paint and Resin

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- Opaque Water Based Acrylic Varnish
- Water Based Acrylic Semi-gloss Varnish
- Lotus Traffic Paint
- Normal Decorative Crack Paint
- Anti-corrosion Powder Paint
- Electrostatic Powder Paint with Smoke Reduction Properties
- Anti-corrosion Alkyd Paint
- Anti-corrosion Epoxy Paint
- Insulating Paint containing Silica Aerogel
- Self-cleaning Paint (Nanofam SC)
- Thermoplastic Acrylic Nanocomposite Resin
- Traffic Paint
- Water-based Inkjet Ink Formulated with Pigment Nanoparticles
- Antibacterial Paint
- Oil Filter Glue (URASEAL)
- Nano tech Antibacterial Electrostatic Powder Coating



**ALVAN**

Paint and Resin PRODUCTION



## Opaque Water Based Acrylic Varnish

### Introduction



Since solvent based varnish are harmful for human health and need too much environmental considerations, water based varnish have gained lots of efforts for improvement. These varnishes are significantly biocompatible and slightly toxic. While water based lacquer vapor is lightly hazardous and does not include ignition danger like its solvent based type, water based acrylic varnish are recommended for use alongside ALVAN water based acrylic paint as topcoat for improving coatings durability in every condition like light resistance, weather resistance and helps development of a glossy smooth surface. Less drying time and a good-looking finish are also these varnish properties. Other advantages for this type of lacquer are wash ability, better strength in final coating, ease of application and miscibility with water, lacking of malodor, abrasion resistance, UV and light resistance and biocompatibility.

### Application

- Particularly to create opaque surfaces
- Used to increase resistance and lifetime of water based acrylic paints



### Technical specifications:

- Physical State: liquid
- Solid Content: 40 wt%
- Density: 1.05 gr/cm<sup>3</sup>
- Wet Film Thickness: 100 ×m
- Dry Film Thickness: 35-40 ×m
- Surface Drying Time: 1 hour
- In-depth Drying Time: 3 hour
- Min. Interval Time: 3 hour
- Full Cure: 1 day



### Advantage of Using Nanotechnology

Generally, surface roughness leads to the formation of an opaque surface. Blurring agents by creating surface roughness disturb the light reflection from the surface and make the surface opaque. In this product nanoparticles are used as blurring agents.



### Certificates and Standards

- NanoScale Certification
- ASTM D523

### About Company

Name of Company	ALVAN
Website	<a href="http://www.alvanpaint.com">www.alvanpaint.com</a>
Email	<a href="mailto:info@alvanpaint.com">info@alvanpaint.com</a>



# Water Based Acrylic Semi-gloss Varnish



## Introduction

Since solvent-based varnishes are harmful for human health and need too much environmental considerations, water-based varnishes have gained lots of efforts for improvement. These varnishes are significantly biocompatible and slightly toxic. While water-based lacquer vapor is lightly hazardous and does not include ignition danger like its solvent-based type, water-based acrylic varnishes are recommended for use alongside ALVAN water-based acrylic paint as topcoat for improving coatings durability in every condition like light resistance, weather resistance and helps development of a glossy smooth surface. Less drying time and a good-looking finish are also the feature of these varnishes. Other advantages of this type of lacquer are washability, better strength in final coating, ease of application and dilution with water, absence of malodor, abrasion resistance, UV and light resistance, and biocompatibility.



### Application

- Creation of semi-shiny surfaces
- Increasing resistance and lifetime of water-based acrylic paints



### Advantage of Using Nanotechnology

Generally, surface roughness leads to the formation of an opaque surface. Blurring agents by creating surface roughness disturb the light reflection from the surface and make the surface opaque. In this product nanoparticles are used as blurring agents. Determination of gloss value was performed according to the ISO 2813 and based on standard test method mentioned in ASTM D523.

ISO 2813: Paints and varnishes -- Determination of gloss value at 20 degrees, 60 degrees and 85 degrees

ASTM D523: Standard Test Method for Specular Gloss



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	ALVAN
Website	<a href="http://www.alvanpaint.com">www.alvanpaint.com</a>
Email	<a href="mailto:info@alvanpaint.com">info@alvanpaint.com</a>



# Lotus Traffic Paint

## Introduction



Paint is mainly composed of finely ground pigments and fillers that are mixed into a resin or binder system. A liquid (water or solvent) is added to the mixture to produce flexibility in the final product for application in different cases. Then various ingredients and additives are incorporated for certain desired properties. This product is based on thermoplastic acrylic resin containing nano-clay, which increases wear resistance.

## Application



- Coating for components which are susceptible to wear and friction
- Wear-resistant paint for applications such as road marking, etc.



### Advantage of Using Nanotechnology

The product is an anti-scratch paint containing nanoscale particles (nano-clay) which increase the wear resistance of the paint. The evaluation of wear resistance was carried out by ASTM D4060.

ASTM D4060: Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser



### Certificates and Standards

- NanoScale Certification
- Iran Standard Certification

### About Company

Name of Company	Asia Technology Pioneers
Website	<a href="http://www.tnpaint.com">www.tnpaint.com</a>
Email	<a href="mailto:info@tnpaint.com">info@tnpaint.com</a>



# Normal Decorative Crack Paint



## Introduction

Crackle techniques are most often applied to represent an aged effect. A crackle effect can also be applied for interesting texture and backgrounds, and applied to mimic organic forms like tree bark, stone and rock surfaces, and even the skin of a leaf. Crackle Paint is a fast-drying paint that crackles as it dries to create an eggshell cracking pattern in just one step. As the paint dries, it will begin to crack, showing the base color underneath.



## Application

- Can be applied onto various surfaces with different shapes



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Asian Decorative Crack Paint Co.
Website	<a href="http://www.crackpaint.com">www.crackpaint.com</a>
Email	<a href="mailto:info@crackpaint.com">info@crackpaint.com</a>



# Anti-corrosion Powder Paint



## Introduction

Corrosion is the gradual destruction of materials by chemical reaction with their environment. It degrades the useful properties of materials and structures including strength, appearance and permeability to liquids and gases. The amount by which a corrosion coating reduces the rate of corrosion varies depending on the kind of metal and its environment, and is notably slower in room temperature air for aluminum, chromium, zinc, titanium, and silicon. Because of excellent corrosion resistance, thermal stability and less conductivity, SiO<sub>2</sub> is an excellent anti-corrosion material. Inactivity and low cost make silica an excellent filler and extender for paint. Adding silica to paint creates textural qualities in paint without affecting its color. Silica has little color in drying oil, so it can be added to oil paint without affecting the tint of the color. Due to its hardness it tends to add a discernible texture to paint.



### Application

- To protect and preserve the buildings structure, all steel constructions in the oil and gas industries, power stations, bridges, cellulose mills, fish factories and etc.



### Advantage of Using Nanotechnology

Addition of SiO<sub>2</sub> nanoparticles to the paints can improve the macro- and micro-hardness, abrasion, scratch and corrosion resistance. However, SiO<sub>2</sub> nanoparticles decrease the elasticity of the paints, which is necessary to resist against swelling and shrinking associated with temperature and humidity changes. The evaluation of anti-corrosion properties of this product was performed by ASTM B117.

ASTM B117-16: Standard Practice for Operating Salt Spray (Fog) Apparatus



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Fam Gostar Mahan
Website	<a href="http://www.famgostarmahan.com">www.famgostarmahan.com</a>
Email	famgostarmahan@ymail.com



# Electrostatic Powder Paint with Smoke Reduction Properties

## Introduction



Use of powder paint as an alternative for liquid paint has created a great evolution in the color quality. Liquid paints create environmental pollution because of possessing evaporative chemical solvents during drying, and they are harmful for human health. The powder paint entered to the market for the first time in 1962. Keeping of 100% solid state, in addition to environmental pollution prevention, has offered incomparable quality against liquid paints to the industry. Powder paints are now taken 15% of the market share and compete with traditional liquid paints. Due to environmental laws on pollution and waste removal, replacement of liquid paints with powder paints becomes more important every day.

## Application



- Suitable to coat different components of home appliances, car parts, metal furniture, office and training equipment, heating and cooling equipment, and some aluminum profiles.



### Advantage of Using Nanotechnology

This product contains silica nanoparticle; silica can be used as a flame retardant in polymer composites. The result of increased thermal stability is the reduction of smoke after curing of paint.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Kian Rangin
Website	<a href="http://www.kianranginco.com">www.kianranginco.com</a>
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Nano Arisa



# Anti-corrosion Alkyd Paint



## Introduction

When metallic materials are put into corrosive environments, they tend to have chemical reactions with the air and/or water. The effects of corrosion become evident on the surfaces of these materials. Metal equipment lacking any preventive (anti-corrosive) measures may become rusted inside and outside, depending on atmospheric conditions and how much of that equipment is exposed to the air. Anti-corrosion measures are of particular importance in environments where high humidity, mist, and salt are factors. There are a number of methods for preventing corrosion which the most effective one is painting treatments on the surface. In this method, anti-corrosive paint acts as a barrier that inhibits contact between chemical compounds or corrosive agents with the metal surface.



## Application

- Particularly used to coat different surfaces inside buildings and industrial applications



### Advantage of Using Nanotechnology

This product consists of graphene oxide nano-object and some impurities including pure graphene, graphite, and amorphous carbon. High resistivity of graphene makes coatings durable and resistant to water, oil, and air. High adhesion property of graphene also causes high adhesion of the paint. The evaluation of anti-corrosion properties and scratch resistance of coating were performed by ASTM B117-16 and ASTM D1654-16 standards, respectively.

ASTM B117-16: Standard Practice for Operating Salt Spray (Fog) Apparatus

ASTM D1654-16: Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Nano Arisa Pooshesh
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Email	<a href="mailto:info@nanoarisa.com">info@nanoarisa.com</a>



Nano Arisa



# Anti-corrosion Epoxy Paint

## Introduction



In advanced technological era corrosion is still considered a major problem because it is the main cause of industrial failures and loss of billions of dollars annually for preventive maintenance and restoration of metal substrates. Corrosion resistant paints protect metal components against degradation due to the moisture, salt spray, oxidation or exposure to a variety of industrial chemicals. Anti-corrosion coating allows for added protection of metal surfaces and acts as a barrier to inhibit the contact between chemical compounds or corrosive materials. Addition of nanoparticles as fillers to the polymeric paints not only increases their efficiency in terms of corrosion resistance but also improves their mechanical properties.

## Application

- Protecting metal components against degradation due to the moisture, salt spray, oxidation or exposure to a variety of industrial chemicals



### Advantage of Using Nanotechnology

Corrosion resistance of epoxy-based nanocomposite can be attributed to the barrier properties of nanoparticles. Addition of nanoparticles improves the adhesion of coating to the metal surface. These particles by reducing voids in coating and increasing penetration route for corrosive solution creates better barrier properties in polymer coatings. The evaluation of anti-corrosion properties and scratch resistance of coating were performed by ASTM B117-16 and ASTM D1654-16 standards, respectively.

ASTM B117-16: Standard Practice for Operating Salt Spray (Fog) Apparatus

ASTM D1654-16: Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Nano Arisa Pooshesh
Website	<a href="http://www.nanoarisa.com">www.nanoarisa.com</a>
Email	<a href="mailto:info@nanoarisa.com">info@nanoarisa.com</a>



# Insulating Paint containing Silica Aerogel



## Introduction

Insulating Paint is a hydrophobic, nature-friendly and liquid form of insulations that can be painted on most surfaces with a thickness of less than a millimeter for greater thermal resistance over traditional insulation. This material allows the coatings to effectively inhibit heat transfer with a thin layer, while also providing other performance benefits such as moisture resistance, UV resistance, mildew and mold resistance, non-toxic, low VOC, non flammable insulation, durability in extreme environments.



## Application

- For a wide variety of thermal insulation applications over equipment like pipes, pipelines, tanks, interior and exterior walls, ceilings, etc.



### Advantage of Using Nanotechnology

Addition of silica aerogel to the paint creates an efficient compound with combined properties such as nature-friendly and excellent thermal insulation. In other words utilization of silica aerogel in the formulation of the paint decreases the heat loss.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	NANOFAN Industrial Group
Website	<a href="http://www.nanoisola.com">www.nanoisola.com</a>
Email	<a href="mailto:info@nanofanco.com">info@nanofanco.com</a>



# Self-cleaning Paint (Nanofam SC)

## Introduction



NanoFam SC is a novel technology in order to reduce the cost of maintenance and time. This product shows excellent optical and mechanical properties. In presence of sunlight, this product can easily decompose dirt and organic pollutants. NanoFam SC is a self-cleaning water-based coating containing Titanium dioxide (TiO<sub>2</sub>). This transparent coating takes advantage of catalytic property of TiO<sub>2</sub>. In the existence of light, the photocatalyst will be able to decompose environmental pollutants. Furthermore, since these materials do not adhere to the surface, the remaining pollutants are removed easily and quickly by the rain.

## Application



- Suitable choice for protecting exterior facades of buildings against environmental pollution
- In hospitals and clean rooms because of having self-cleaning properties



### Advantage of Using Nanotechnology

Photocatalysis is not the only photochemical effect of TiO<sub>2</sub> nanoparticles; under UV exposure, TiO<sub>2</sub> becomes super-hydrophilic and prevents contact between pollutants and coating surface. The synergy of these two photo-induced properties is the base of self-cleaning ability of TiO<sub>2</sub>.



### Certificates and Standards

- NanoScale Certification
- Iran Standard Certification

### About Company

Name of Company	Nilifam Rey
Website	<a href="http://www.nilifam.com">www.nilifam.com</a>
Email	info@nilifam.com



# Thermoplastic Acrylic Nanocomposite Resin

## Introduction



This product is a nanocomposite based on thermoplastic acrylic resin containing modified clay. This product is used in the production of paint. In nanocomposites inorganic filler is dispersed within a polymer matrix at a nanoscale level, thus the clay layer could be intercalated or exfoliated into the polymer to form polymer-clay nanocomposite. This resin has very good pigment wettability, and is compatible with commonly used pigments and fillers in the paint industry.

## Application

- Production of traffic paints in temperate and cold regions



### Advantage of Using Nanotechnology

Existence of intercalated and exfoliated clay in the product has led to the improvement in hardness, abrasion and scratch resistance and resistance to water and chemical materials.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Reef Chemical Industrial Group
Website	<a href="http://www.reefiran.com">www.reefiran.com</a>
Email	<a href="mailto:info@reefiran.com">info@reefiran.com</a>



**REEF**  
CHEMICAL & INDUSTRIAL GROUP



# Traffic Paint

## Introduction



This product is traffic paint based on thermoplastic acrylic nanocomposite resin. In nanocomposites inorganic filler is dispersed within a polymer matrix at a nanoscale level, thus the clay layer could be intercalated or exfoliated into the polymer to form polymer/clay nanocomposites. The paint has a fast drying time, high durability, excellent resistance to various weather conditions and excellent adhesion to surfaces covered with asphalt and cement.

## Application

- Marking the runway, city and intercity streets, roads, crosswalks, sports fields and curbs



### Advantage of Using Nanotechnology

Addition of intercalated and exfoliated clay to the product has led to the improvement of hardness, abrasion and scratch resistance, and also resistance to water and chemical materials. The evaluation of wear resistance was carried out by ASTM D4060.

ASTM D4060: Standard Test Method for Abrasion Resistance of Organic Coatings by the Taber Abraser



### Certificates and Standards

- NanoScale Certification
- Iran Standard Certification

### About Company

Name of Company	Reef Chemical Industrial Group
Website	<a href="http://www.reefiran.com">www.reefiran.com</a>
Email	info@reefiran.com



## Water-based Inkjet Ink Formulated with Pigment Nanoparticles



### Introduction

Ink is a liquid or paste that contains pigments or dyes and is used to color a surface to produce an image, text, or design. Ink can be a complex medium, composed of solvents, pigments, dyes, resins, lubricants, solubilizers, surfactants, particulate matter, fluorescents, and other materials. Pigment inks are used more frequently than dyes because they are more color-fast, but they are also more expensive, less consistent in color, and have limited color range than dyes. Pigments are solid, opaque particles suspended in ink to provide color. Pigment molecules typically link together in crystalline structures that are  $0.1-2 \times m$  in size and comprise 5-30 percent of the ink volume. Qualities such as hue, saturation, and lightness vary depending on the source and type of pigment.

### Application

- Ink is used for drawing or writing with a pen, brush, or quill. Thicker inks, in paste form, are used extensively in letterpress and lithographic printing. This product is particularly used in inkjet printers.

### Advantage of Using Nanotechnology

This product contains porous black carbon nanoparticles with a size distribution of 20 to 50 nm. In nanoscale, carbon particles are dispersed better in ink than those of bulk matter which leads to better efficiency and quality of printing. Nanostructured inks are highly consistent with the advanced printers including the nozzles with diameter less than 500 nm.

### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Tajhiz Gama
Website	<a href="http://www.tajhizgama.com">www.tajhizgama.com</a>
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# Antibacterial Paint



## Introduction

Paints with antimicrobial technology can provide an added level of protection from harmful microbes in areas such as hospitals, care homes, food preparation areas and schools, where minimizing the risk of cross-contamination is crucial. Antibacterial paints, water-based acrylic paints containing silver nanoparticles, are completely resistant to bacteria and mould- preventing odors and making them more hygienic and durable without affecting the final aesthetic finish. When bacteria come into contact with a protected surface, the active antimicrobial agent prevents them from growing, producing energy or replicating, inhibiting any further growth.



## Application

- Suitable for any application, where controlling bacterial transmission is important from bathroom fittings, food preparation benches and worktops to door handles and handrails on public transport.



### Advantage of Using Nanotechnology

The silver antibacterial effect remarkably increases with size reduction up to nanoscale, in a way that they can kill more than 650 bacterial species. By decreasing particle size, the release of silver ions increases, which as a result improves antibacterial activity. Determining the antibacterial activity of this product was carried out by ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces

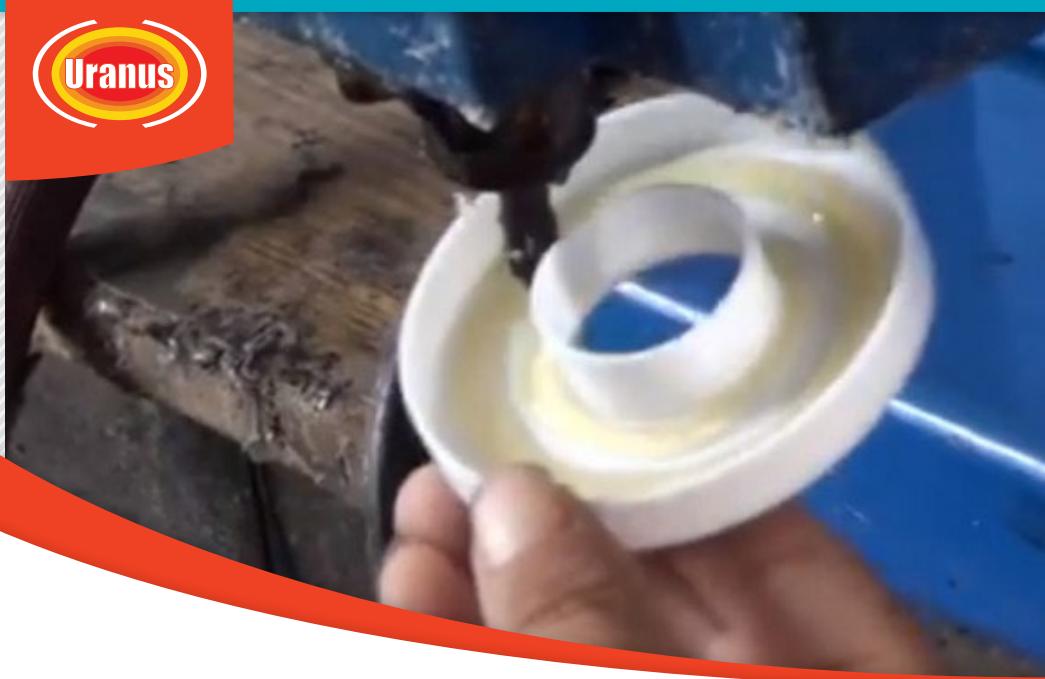


### Certificates and Standards

- NanoScale Certification
- Iran Ministry of Health Safety Certification

### About Company

Name of Company	Tehran Uranus Paint MFG
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# Oil Filter Glue (URASEAL)

## Introduction



Manufacturers use adhesives to fabricate numerous filter components - to assemble the filter media itself, bond the filter media into a frame or install the gasket. Filter manufacturers have long used PVC plastisols for adhesion and molding. They require no mixing and can be pumped directly from a drum. They also cure through exposure to high heat for at least 10 minutes. Low viscosity of the glues is considered as a drawback which makes the glue useless. Nanoparticles are able to promote the viscosity of PVC glues by acting as nanofillers.

## Application



- Bonding the filter media into a frame or installing the gasket



### Advantage of Using Nanotechnology

Nanoparticles added to the paint are hydrophobic and do not allow water to penetrate to the substrate surface. Furthermore, nanoparticles act as a barrier to inhibit reaching corrosion agents to the metal substrate by the formation of insoluble deposition. Determination of viscosity of this product was performed according to the ASTM D1200.

ASTM D1200: Standard Test Method for Viscosity by Ford Viscosity Cup



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Tehran Uranus Paint MFG
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# Nano tech Antibacterial Electrostatic Powder Coating

## Introduction



These antibacterial productions are suitable for active devices in hospital, clinical and laboratory places, home and kitchen application. By covering the surfaces with intrinsic properties of Nano-particles used in the coatings, any microbial contamination and bacteria and fungi, in the surface of Nano-particles is broke down and destroyed. This offered Nano-technology product beside having all the properties of powder coatings (such as uniformity level, physical, impact, flexural and scratch resistance, chemical resistance, corrosion resistance, cleaning solvents...) has the ability to remove and destroy bacteria as well and by improving product quality will take important steps to improving product quality will take important steps to improve and maintain public health. This kind of powder coating were test with *S.aureus* bacteria (ATCC6538) and *Ecoli* (ATCC 8739) and test results were successful.



### Application

- These antibacterial productions are suitable for coating of active devices in hospital, clinical and laboratory places, home and kitchen application



### Advantage of Using Nanotechnology

We use nanotechnology and nano particles for killing of harmful bacteria! Also we improve chemical and physical properties of electrostatic powder coating with nano particles.



### Certificates and Standards

- NanoScale Certification

## About Company

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# Polymer and Composite

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- Plus F Waffle Slabs
- Hard PVC Nanocomposite
- Antibacterial ABS Granule
- Antibacterial ABS Masterbatch
- Antibacterial Polyamide Masterbatch
- Antibacterial Polyethylene Masterbatch
- Antibacterial Polypropylene Masterbatch
- Silent Sewage Pipes and Fittings Polypropylene Nanocomposite
- Printable Polymer
- High Strength Polyethylene Masterbatch
- Antibacterial Granule
- Polyamide-Carbon Nanotubes Nanocomposite



# Plus F Waffle Slabs

## Introduction



Plus polymer waffle slabs are manufactured through an injection molding process. The material used is a high performance Polypropylene-based nano compound that has been developed in the Materials Department of Plus Polymer. This compound benefits from an incredible balance of stiffness and toughness. It also possesses the capability to remove the shrinkage and warpage of final products, which will lead to higher precision in performance. High mechanical properties of the compound helps the mold to withstand heavy loadings and the possibility of being reused over 50 times.

## Application



○ Waffle slab is a type of building component which has two directional reinforcements on the outside and contains a grid-like system on its bottom surface. It is used in areas where lower numbers of columns are provided. In other words, this product is basically used in areas with long spans.



### Advantage of Using Nanotechnology

Technology: The special mechanical properties of Plus F waffle slabs are rooted in long-term research and development in the company, resulting in their unique performance.

Durability: Due to the state-of-the-art technology employed in Plus F waffle slabs, these products are reusable for many times without any decrease in quality.

Well-exposed surface: Due to the premium surface quality and the minimum level of shrinkage and warpage in Plus F waffle slabs, they provide a well-finished surface and can readily be used without the need for any furnishing in car parks, hospitals, retail centers and hotels (they can also be painted to provide an enhanced finish).

Competitive Price: Due to the quality, mechanical properties, and the other advantages of Plus F waffle slabs, the prices are very competitive in comparison with other similar products.

Handling: Plus F waffle slabs can be transferred easily and compactly stored in limited spaces, and they also would not be affected adversely by moisture, low temperature, and sunlight.

Dismantling: Concrete does not adhere to plastic, making dismantling quick and easy. No forming oil is required. The rate of dismantling is remarkable and no need for any additional facilities.

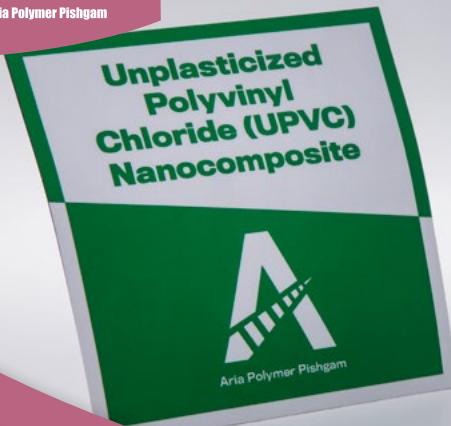


### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Plus Polymer
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# Hard PVC Nanocomposite



## Introduction

This product is unplasticized polyvinyl chloride (UPVC) reinforced with nanoparticles. UPVC is one of the most widely used polymers in building, especially in pipes and fittings, as well as door and window profiles. UPVC has high impact toughness and the color of its outer surface is white. Nanoparticles because of having high specific surface area, give unique properties to this polymer. Calcium carbonate nanoparticles are one the most common reinforcements, added to UPVC to improve its impact toughness.



## Application

- Fabrication of windows and doors



### Advantage of Using Nanotechnology

This nanocomposite product has been reinforced with calcium carbonate nanoparticles with average size less than 100 nm. Nanoscale reinforcements improve the strength, modulus, and toughness of the polymer matrix. These unusual features are due to the high specific surface area of nanoparticles. The evaluation of fracture resistance of this product was carried out by ISIRI 12291.

ISIRI 12291: Unplasticized polyvinylchloride (PVC-U) profiles for the fabrication of windows and doors-Classification, requirements and test methods



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Aria Polymer Pishgam
Website	<a href="http://www.ariapolymer.ir">www.ariapolymer.ir</a>
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# Antibacterial ABS Granule



## Introduction

ABS polymer is composed of three different monomers, including Acrylonitrile, Butadiene and Styrene, in which each monomer gives unique properties to the final product. Some of these properties are transparency, flexibility, and polarity and chemical resistance which are created by styrene, butadiene, and acrylonitrile, respectively. Therefore, by changing the percentage of each monomer in composition, several grades of ABS can be produced. This material has different applications such as plastic parts that are used in home appliances. ABS masterbatch granules are produced using modified antibacterial nanomaterials. To gain better properties which facilitate the use of ABS in fabrication of components with antibacterial feature, this material can also be mixed with other polymers, such as polyvinyl chloride or polycarbonate.



## Application

- Fabrication of components used in home appliances such as refrigerator, vacuum cleaner, ...
- Antibacterial tools, including children's toys



### Advantage of Using Nanotechnology

The growth and proliferation of bacteria can be prevented inside the fridge body by production of ABS antibacterial masterbatch via addition of zinc oxide nanoparticle to ABS granules. Determining the antibacterial activity of this product was carried out by ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces



### Certificates and Standards

- NanoScale Certification

### About Company

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# Antibacterial ABS Masterbatch

## Introduction



Many studies have been done in the last decades to investigate the possible methods which can be used to produce antibacterial plastics. Masterbatch (MB) is a solid or liquid additive for plastic used for coloring plastics (color masterbatch) or imparting other properties to plastics (additive masterbatch). The use of masterbatch allows the factory to keep stock of fewer grades of the polymer, and to buy cheaper natural polymer in bulk. ABS polymer is composed of three different monomers, including Acrylonitrile, Butadiene and Styrene, in which each monomer gives unique properties to the final product. The use of different organic and inorganic materials such as tea extract, chitosan, copper, silver, zinc, etc. in polymer matrices is the most widely used method to produce antibacterial plastics.

## Application



- Manufacture of products such as sewage pipe systems, musical instruments, automobile decorative components, medical equipment, electronic circuit boxes, etc.



### Advantage of Using Nanotechnology

This product includes nanoparticles with average particle size of 20-30 nanometer. Nanoparticles because of having high specific surface area show better antibacterial properties. Determining the antibacterial activity of this product was carried out by ISIRI 13703.

ISIRI 13703: Plastics- Evaluation of antibacterial activity in polymeric or hydrophobic materials- Test Method

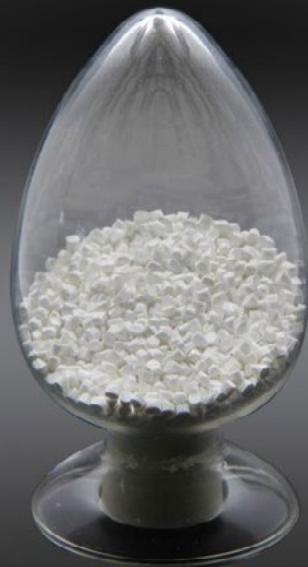


### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Parsa Polymer Sharif
Website	<a href="http://www.parsapolymer.com">www.parsapolymer.com</a>
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# Antibacterial Polyamide Masterbatch

## Introduction



Synthetic polyamides, due to their durability and high strength, are usually used in textile industry, automobile, carpets and sportswear. Many studies have been done in the last decades to investigate the possible methods which can be used to produce antibacterial plastics. New plastic materials with intrinsic antibacterial properties can be produced through polymerization or co-polymerization of new monomers or by chemical modification and/or mixing of different polymers. Masterbatch (MB) is a solid or liquid additive for plastic used for coloring plastics (color masterbatch) or imparting other properties to plastics (additive masterbatch). The use of different organic and inorganic materials such as tea extract, chitosan, copper, silver, zinc, etc. in polymer matrices is the most widely used method to produce antibacterial plastics.



### Application

- In textile industry, automobile, carpets and sportswear



### Advantage of Using Nanotechnology

Nanoparticles generate more active oxygen species compared with bulk samples; therefore, these materials show better antibacterial activity. Determining the antibacterial activity of this product was carried out by INSO 10900.

INSO 10900: Measurement of antibacterial activity on plastics and other non-porous surfaces



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Parsa Polymer Sharif
Website	<a href="http://www.parsapolymer.com">www.parsapolymer.com</a>
Email	<a href="mailto:zokaei@parsapolymer.com">zokaei@parsapolymer.com</a>



# Antibacterial Polyethylene Masterbatch

## Introduction



Polyethylene (PE) is the most commonly used plastic polymer in the world. New plastic materials with intrinsic antibacterial properties can be produced through polymerization or co-polymerization of new monomers or by chemical modification and/or mixing of different polymers. Masterbatch (MB) is a solid or liquid additive for plastic used for coloring plastics (color masterbatch) or imparting other properties to plastics (additive masterbatch). The use of different organic and inorganic materials such as tea extract, chitosan, copper, silver, zinc, etc. in polymer matrices is the most widely used method to produce antibacterial plastics. Zinc oxide nanoparticles are widely used for this purpose. A prevalent feature of this material is its antibacterial activity which has been proven against human pathogenic bacteria.

## Application

- Particularly in manufacturing of plastic stuff





### Advantage of Using Nanotechnology

This product contains zinc oxide nanoparticles with average size around 30 nm. Zinc oxide nanoparticles generate more active oxygen species compared with bulk samples; therefore, these materials show better antibacterial activity. Determining the antibacterial activity of this product was carried out by INSO 11900.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Parsa Polymer Sharif
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# Antibacterial Polypropylene Masterbatch

## Introduction



Masterbatch is a solid or liquid additive for plastic used for coloring plastics (color masterbatch) or imparting other properties to plastics (additive masterbatch). The use of masterbatch allows the factory to keep stock of fewer grades of the polymer, and to buy cheaper natural polymer in bulk. Polypropylene is an economical thermoplastic polymer, normally tough and flexible, used as an engineering plastic, competing with materials such as acrylonitrile butadiene styrene (ABS). The most frequently used approach to prepare antibacterial plastics is to include various organic or inorganic substances in polymer matrices. Nanoparticles are being used industrially for modifications of plastics. A common feature is their antibacterial activity. The antibacterial activity of them has been demonstrated against human pathogenic bacteria, mainly E. Coli and S. aureus.



### Application

- Particularly in manufacturing of piping systems, carpets, plastic molds
- As dielectric within certain high-performance pulse and low-loss RF capacitors, etc.



### Advantage of Using Nanotechnology

The addition of nanoparticles in the range of 20-30 nm to the product creates high antibacterial activity; this effect stems from high specific surface area of nanoparticles. Determining the antibacterial activity of this product was carried out by ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Parsa Polymer Sharif
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Email	<a href="mailto:zokaei@parsapolymer.com">zokaei@parsapolymer.com</a>



# Silent Sewage Pipes and Fittings Polypropylene Nanocomposite

## Introduction



Noise is considered as one of the main factors of industrial pollution, especially in sewage systems of residential and commercial real estate. In modern societies, noise pollution is enumerated as an environmental challenge and byproduct of technological development in different industries. The main purpose for producing noise reduction materials is achieving a material with high absorption rate and better noise reduction coefficient (NRC). Polymer composites reinforced with mineral particles, in addition to the noise reduction feature, have high optical quality and high specific strength.

## Application

- Soundproof polymer composites are used to remove noise from pipes and fittings used in wastewater transfer systems



### Advantage of Using Nanotechnology

The high surface area to volume ratio of nanoparticles, which are considered as reinforcing factors, enhances the hardness and stiffness of polymers to their maximum values, while having little effect on tensile strength. The evaluation of tensile properties and Charpy impact resistance of this product were carried out by ASTM D638 and ASTM D6110.

ASTM D638: Standard Test Method for Tensile Properties of Plastics  
ASTM D6110: Standard Test Method for Determining the Charpy Impact Resistance of Notched Specimens of Plastics



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Parsa Polymer Sharif
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Email	<a href="mailto:zokaei@parsapolymer.com">zokaei@parsapolymer.com</a>



# Printable Polymer

## Introduction



Plasma technology has many useful applications, so it has extended into various industries such as automobile, electronics, medicine, textiles, cosmetics and materials. Since plasma is a relatively novel technology, its applications are still under investigation. Surface modification is the most suitable and useful application of plasma technology. The main aim in surface modification by plasma is changing the surface properties to either increase or decrease surface adhesion ability. Basically, surface adhesion of a material is related to its surface energy and enhances with increasing the surface energy. To improve the paint adhesion effectively, surfaces undergo a surface modification treatment. This process will be very efficacious when a certain plastic surface with low surface energy is supposed to be painted.

## Application

- Improving the paint adhesion of polymeric surfaces





### Advantage of Using Nanotechnology

Creation of nanoscale roughness on the polymeric surfaces using plasma improves paint adhesion to the surface. To determine the resistance of paint the paint adhesion test was conducted according to ASTM D3359. ASTM D3359: Standard Test Methods for Rating Adhesion by Tape Test



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Plasma Ide Azma Engineering Co.
Email	parsautomation@yahoo.com



# High Strength Polyethylene Masterbatch

## Introduction



Plastics are used in a wide range of industries, including packaging, construction and building, electronics, aerospace and transportation. In addition to the wide range of products, design is a major contribution to this industry. Masterbatch is a liquid or solid additive used to add specific properties to the plastics. The use of masterbatch makes it possible for producers to buy large amount of low grade polymers at a lower price, and obtain their desired properties by adding masterbatch to them. The base of a masterbatch can be a wax (universal carrier) or a particular polymer that is identical or compatible with the original polymer. Low density polyethylene (LDPE) can be used as a masterbatch for polyolefin. LDPE is a thermoplastic made of ethylene monomer, and the first grade of polyethylene. LDPE is an important plastic grade which can be used in manufacturing of various materials, including polymer films.



### Application

- Particularly in manufacturing of polymer films



### Advantage of Using Nanotechnology

Addition of nanoparticles as reinforcement to a polymer structure can strengthen the interaction between the polymer matrix and the reinforcements, and consequently leads to a significant increase in the electrical, thermal, and mechanical properties.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Pooya Polymer Tehran
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## Antibacterial Granule



# Antibacterial Granule

### Introduction



This product is a polypropylene-zinc oxide nanocomposite granule, with antibacterial properties due to the presence of zinc oxide nanoparticles. Textiles are a nutrient medium for the growth of bacteria. In order to produce antibacterial textiles, nanoparticles have been used widely. Zinc oxide nanoparticles are one the most commonly used nanoparticles to deal with bacteria. The main application of this nanocomposite granule is the production of ultra-thin fibers which are used in textiles.

### Application

- Food packaging
- Textile
- Laboratory and medical equipment



### Advantage of Using Nanotechnology

This product contains zinc oxide nanoparticles with average particle size less than 100 nm. Zinc oxide has antibacterial effect; and zinc oxide nanoparticles because of having high specific surface area show better antibacterial properties. Determining the antibacterial activity of this product was carried out by ISIRI 13703.

ISIRI 13703: Plastics- Evaluation of antibacterial activity in polymeric or hydrophobic materials- Test Method



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Rangdaneh Sirjan
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# Polyamide-Carbon Nanotubes Nanocomposite

## Introduction



Most polymers are typical insulators with high surface resistivity. Too high surface resistivity prevents control of charge build-up and limits dissipation of static charges, while too low surface resistivity will result in fast electrostatic discharges from the plastic part. The electrostatic problem can be solved by incorporation of antistatic agents or conductive fillers into the polymer. Such conductive fillers form a percolating, conductive network inside the polymer matrix. Carbon nanotubes are one of the common conductive fillers with unique mechanical, electrical and thermal properties, which are excellent candidates to produce electrostatic dissipative materials and other useful components in electronics.

## Application

- Production of components of automotive fuel system for improving its Electrostatic Discharging (ESD) property



### Advantage of Using Nanotechnology

The interfacial adhesion between CNTs and polymer is critical to optimize the mechanical and other functional properties. CNTs can increase the capability of polymer to enhance the dispersion and interfacial bonding between the components. It also increases the electrical conductivity due to strong electron transfer capability.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Razin Engineering Plastics
Website	<a href="http://www.razinpolymer.com">www.razinpolymer.com</a>
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# Household Goods

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- Antibacterial Refrigerators
- Washing Machine with Corrosion-resistant Body
- Cutting Board
- Antibacterial Air Filter for Evaporative Cooler
- Antibacterial Rubbish Bin
- Antibacterial Chinaware with Hydrophobic Coating
- Utensils with Golden Nanostructured Coating
- Tomato Paste Container



# Antibacterial Refrigerators



## Introduction

Nowadays, refrigerators and freezers are one of the main requirements in all kitchens. These appliances are used to decrease the food spoilage and increase their preservation time. It should be mentioned that the existence of bacteria in the refrigerator reduces the length of time that food remains edible and nutritious. This is due to the fact that the bacteria accelerate the spoilage of food, and even in some cases are considered as pathogenic agents. To decrease the presence of bacteria in the refrigerator and thereby reducing the food spoilage, the following refrigerators are developed with antibacterial interior body by utilizing nanotechnology.

- COMBI refrigerator
- Refrigerator
- Twin refrigerator
- Side by side refrigerator



### Advantage of Using Nanotechnology

The antibacterial properties can be improved by using granules containing nanomaterials. The antibacterial activity of these products was evaluated by ISIRI 10900 standard.

ISIRI 10900 standard: Measurement of antibacterial activity on plastics and other non-porous surfaces



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Clever Iranian Sharh
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Email	iraniancelever@gmail.com



Pak Shooma



# Washing Machine with Corrosion-resistant Body



## Introduction

Nowadays, the washing machines are an integral part of our everyday life. However, since these appliances are permanently exposed to water and detergents, they are highly susceptible to corrosion. To deals with this issue, suitable coatings such as conversion coatings have been developed. Conversion coatings are coatings for metals where the surface of component is subjected to a chemical or electro-chemical process by the coating material which converts it into a decorative or protective substance. Examples include chromate, phosphate and zirconium conversion coatings on steel, and anodizing. Conversion coatings are widely used to protect metal surfaces against corrosion. In this product, to improve the corrosion resistance and adhesion of color onto the surface, the conversion coatings with a nanometer thickness are used. The products made bay this company are as follows:

- Washing machine
- Top load washing machine



### Advantage of Using Nanotechnology

The use of conversion coatings with a nanometer thickness improves corrosion properties. As to above-mentioned products, the coated samples were first scratched according to ASTM D1654-16. Then the corrosion resistance was measured based on ASTM B117-16.

ASTM D1654-16: Standard Test Method for Evaluation of Painted or Coated Specimens Subjected to Corrosive Environments

ASTM B117-16: Standard Practice for Operating Salt Spray (Fog) Apparatus



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Pak Shooma
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Parham  
Plast Ariya



# Cutting Board

## Introduction



A cutting or chopping board is a durable board on which to place material for cutting. The kitchen cutting board is commonly used in preparing food. Cutting boards are often made of wood or plastic and come in various widths and sizes. Unlike wood, most plastic boards are non-porous, which means that bacteria cannot enter below the surface. It is still equally as important to clean the boards thoroughly after each use as bacteria can lie and grow in any imperfections on the surface. Bacteria or allergens can easily be transmitted from one part of the kitchen to another or from one food to another via knives, hands, or surfaces such as chopping boards. Zinc oxide nanoparticles are industrially used to modify plastics. A general characteristic of this substance is its antibacterial properties. The antibacterial activity of zinc oxide nanoparticles has been demonstrated against human pathogenic bacteria, mainly *E. Coli* and *S. aureus*.

## Application

- Particularly for cutting meat and protecting it against bacterial contamination



### Advantage of Using Nanotechnology

The use of zinc oxide nanoparticles causes antibacterial effect due to increased specific surface area, particle surface reactivity and photocatalytic properties. Determining the antibacterial activity of this product was carried out by ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Parham Plast Ariya
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# Antibacterial Air Filter for Evaporative Cooler



## Introduction

A particulate air filter is a device composed of fibrous materials which removes solid particulates such as dust, pollen, mold, and bacteria from the air. Antibacterial air filters are widely used to prevent the growth of bacteria inside the evaporative coolers; the growth of bacteria is attributed to the wet environment inside the coolers. By addition of silver nanoparticles to the filter cloth, silver ions are released within its structure and prevent the growth of bacteria. The concentration of silver ion in this product is 165 ppm.



### Advantage of Using Nanotechnology

The silver antibacterial effect remarkably increases with size reduction up to nanoscale, in a way that they can kill more than 650 bacterial species. By decreasing particle size, the release of silver ions increases, which as a result improves antibacterial activity. Determining the antibacterial activity of this product was carried out by ISIRI 11070.

ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



### Certificates and Standards

○ NanoScale Certification

### About Company

Name of Company	Raymand Intelligent Machine
Website	<a href="http://www.raymandmh.com">www.raymandmh.com</a>
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# Antibacterial Rubbish Bin



## Introduction

A waste container is usually made of metal or plastic. These containers are made of polymers such as polypropylene (PP). Because of having a low production cost, PP has a broad range of applications. The use of antimicrobial PP which is a class of polymers with antibacterial activity has been continuously increased. This is due to the fact that the polymer materials can be easily surrounded by bacteria or fungi, which consequently results in the transmission of diseases and severe infections. Prevention of microbial colonization onto the polymeric surfaces can be fulfilled by adding active antimicrobial agent like silver nanoparticles into the polymers. Silver ions and its compounds are extremely lethal for a wide range of bacteria, whilst they show very low toxicity for human cells. It should be noted that the polymer-silver nanocomposite maintains its antibacterial effect, as if its antibacterial efficiency against a wide variety of bacteria has been widely reported.



## Application

- This product is especially used as trash bin



### Advantage of Using Nanotechnology

Silver nanoparticles because of having antibacterial properties are widely used in a variety of applications. Relying on the conducted studies, silver, either in the form of metal or ion can prevent the bacterial activity and give rise to the antibacterial properties. Determining the antibacterial activity of this product was carried out by ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Sanatsazan Manufacturing Group
Website	<a href="http://www.sanatsazan.ir">www.sanatsazan.ir</a>
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# Antibacterial Chinaware with Hydrophobic Coating



## Introduction

Washing porcelain dishes after a meal is a tedious work. During washing, greasy porcelain dishes are very slippery in hand. Also, in some cases fat stains remain after washing. Moreover, surface of a dish due to direct contact with the hands or leftovers is a good place for growth of bacteria and fungi. The aforementioned problems can be obviated with the aid of nanotechnology; to do this, chinaware with hydrophobic and antibacterial surfaces are produced by the addition of silicon and zinc nanoparticles, respectively. The chinaware produced by this company are classified in two different groups.

- Hydrophobic chinaware
- Antibacterial chinaware



### Advantage of Using Nanotechnology

In respect of hydrophobicity, silicone linear polymers are helical in shape, so providing a lot of free space within their structure for individual water vapour molecules to pass through, whilst water droplets are repelled by the hydrophobic methyl (CH<sub>3</sub>) groups which orientate to the outside, giving repellency to liquid water.

Regarding antibacterial effect, by decreasing zinc particle size up to nanoscale, the release of zinc ions increases, which as a result improves antibacterial activity. Determining the antibacterial activity of the antibacterial chinaware was carried out by ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces



### Certificates and Standards

- NanoScale Certification
- Iran Ministry of Health Certification

### About Company

Name of Company	Taghdis Porcelain
Website	<a href="http://www.taghdisporcelain.com">www.taghdisporcelain.com</a>
Email	taghdisporcelaingonabad@gmail.com



# Utensils with Golden Nanostructured Coating



## Introduction

Today, the use of metals in the fabrication of different dishes, due to the beauty and durability, has attracted a lot of attention. For this reason, a variety of dishes based on different tastes have been introduced to the market. These dishes lose their beauty over time; also, due to washing or other factors they are susceptible to corrosion and scratch. Therefore, to protect the surface against these factors and enhance the beauty, coating the surface with suitable materials is necessary. TiN coatings are corrosion- and abrasion-resistant coatings which because of their beautiful golden color are also used for decorative applications. These ceramic coatings are stable; furthermore, these coatings avoid the formation of stains when exposed to food, detergents and water. Physical Vapor Deposition (PVD) methods because of their salient feature are one of the most common techniques which are used to deposit such coatings onto the surfaces. The products of this company are as follows:

- Tray

- Tea set
- Salad plate

- Soup bowl
- Catering dish

- Hot drinks holders
- Candlestick



### **Advantage of Using Nanotechnology**

Applying a nanostructured coating onto the surface leads to the improvement of corrosion and abrasion resistance.



### **Certificates and Standards**

- NanoScale Certification

### **About Company**

Name of Company	Tak Steel Paya
Website	<a href="http://www.taksteel.com">www.taksteel.com</a>
Email	taksteelpaya@yahoo.com



# Tomato Paste Container



## Introduction

Food preservation refers to the prevention of food corruption (food quality deterioration and loss of nutritional value) which happens by oxygen, bacteria and other microorganisms. Nowadays, with the aid of refrigerators, food corruption occurs less frequently. Nevertheless, the time of preserving food in the refrigerators is limited since preventing the growth of some mildew because of the presence of moisture and oxygen is impossible. Tomato paste is one of the most common flavors which is not excluded from this rule. One of the approaches to preserve tomato paste from corruption is the use of antibacterial containers which are produced using the raw materials containing nanoparticles. These containers not only preserve the foodstuff properties but also prevent the growth of bacteria and fungi. The good antibacterial properties of this product stems from the use of nanoparticles; generally, size reduction up to nanoscale leads to an increase in specific surface area, reactivity, as well as photocatalytic properties and photo-oxidation.



### Advantage of Using Nanotechnology

The antibacterial properties of this product results from the use of nanoparticles; generally, size reduction up to nanoscale leads to an increase in specific surface area, reactivity, as well as photocatalytic properties and photo-oxidation. Determining the antibacterial activity of this product was carried out by ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Zinovin Co.
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# Optic, Electronic and IT

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- Multipurpose Sunglasses with anti-reflective nanocoatings
- Educational Conductive Pen
- Anti-reflection Nanocoating in the Visible Range
- Reticle



# Multipurpose Sunglasses with anti-reflective nanocoatings



## Introduction

Generally, sunglasses protect the eyes from UV radiation and certain age-related conditions. UV radiations are classified into three types or bands-UVA, UVB, and UVC. The ozone layer absorbs some, but not all of these radiations. UVB is harmful to the eyes and also can cause skin burn. Scientists believe that prolonged contact with UVB rays can lead to eye diseases such as cataracts, changes in the macula (center of vision), and the Pterygium (conjunctiva). Standard glasses are designed to absorb at least 98% of UVB. Non-standard ones may lead to eye ground rushes even more cataract and other serious health problems because of failing to prevent harmful UV lights of sun. The suitable sunglasses can actually enhance your vision, increase contrast and colors and cut through glare. In other words, the more visible light transmission they serve, the better vision they will have. This feature can be acquired by the use of nanocoatings.



### Application

- Tourism, exercise, and walking in different weather condition such as sunny, cloudy, or foggy weather



### Advantage of Using Nanotechnology

By using anti-reflective nanocoatings the visible light transmission increases by 5.5%. It is worth mentioning that the absorbance of the visible light of this type of lens is zero.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Electro Optic Sairan Industries
Website	<a href="http://www.ioico.ir">www.ioico.ir</a>
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# **Educational Conductive Pen**



## Introduction

Conductive pens containing high concentration of silver nanoparticles are produced to draw circuits. Today, conductive inks based on nanoparticles are one of the most important commercial products derived from nanotechnology which have attracted much attention in research field in the world. Metallic particles in nanoscale size show unique and enhanced properties such as possessing the highest electrical conductivity per unit volume, so it is expected to be used extensively in manual works for circuit educational at schools.



## Application

#### ○ Educational application and manual work



### Advantage of Using Nanotechnology

Metallic nanoparticles used in this product have unique properties such as the highest electrical conductivity per unit volume.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Nano Mad
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Email	<a href="mailto:info@nanomad.co">info@nanomad.co</a>



# Anti-reflection Nanocoating in the Visible Range



## Introduction

Anti-reflection coatings have been in use since long to overcome the problems due to Fresnel's reflections, which significantly reduces the intensity of transmitted light. It is now established that the application of the multilayer nanocoating on the front surface of the photovoltaic cells or optoelectronic devices reduces the reflection of the incident light improving the device performance. The global value of optical coatings is estimated at \$9.5 billion in 2016.



## Application

- Lenses



### Advantage of Using Nanotechnology

Nanocoating act as an effective medium in which incident light is diffracted off-axis resulting in increasing the average optical path length. This consequently allows the complete light absorption. FESEM results show a thickness less than 100 nm for nano layers. Test results show a remarkable reduction in the light reflection after applying the coating.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Orang Sanat Sepahan
Email	Orangsanat-co@istt.ir



# Reticle



## Introduction

The light scattered from optical surface irregularities degrades optical performance which includes reduction of optical throughput, image contrast and resolution by producing an image blur. BK7 is a high quality optical glass that is used whenever the additional benefits of fused silica are not required. Since BK7 performs well in all chemical tests, and no additional or special handling is required, costs of manufacturing are reduced. BK7 can be used as reticle which is a net of fine lines or fibers in the eyepiece of a sighting device, such as a telescope, a telescopic sight, a microscope, or the screen of an oscilloscope. Nanocoating technology improves the performance of such mirrors so that covering the mirror surface by nano layers minimizes light scattering.



## Application

- Can be used as reticle in the eyepiece of a sighting device, such as a telescope, a telescopic sight, a microscope, or the screen of an oscilloscope



### Advantage of Using Nanotechnology

Nanocoating applied on the surface of mirrors prevent light scattering because of their thickness which is less than the visible light wavelength (less than 100 nm). Use of nanocoatings lead to 5% reduction in light reflection. They also have strong coating adhesion according to the MIL-C-675 standard test.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Orang Sanat Sepahan
Email	Orangsanat-co@istt.ir



# Textiles and Clothing

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- Antibacterial Polypropylene Fiber
- Antibacterial Polyamide Yarn
- Antibacterial Polyester Yarn
- Antibacterial Machine-made Carpet
- Hydrophobic Shoes
- Antibacterial Shoe Insoles
- Antibacterial Socks
- Alaleh Azar Antibacterial Towel
- Antibacterial Bedsheet & Pillowcase
- Antibacterial Towel
- Antibacterial Men's Underwear
- Antibacterial Carpet
- Benita Antibacterial Chador
- HighNo Antibacterial Textiles
- Antibacterial Man-made Carpet
- Selin Antibacterial Towel



سیرجان  
سیرجان  
Sirjan Nano Yarn &  
Granule Complex

## Antibacterial Polypropylene Fiber



Sirjan  
Nano Yarn & Granule



# Antibacterial Polypropylene Fiber

## Introduction



This product is zinc oxide/polypropylene nanocomposite fibers, which due to the presence of zinc oxide nanoparticles show antibacterial properties. The use of zinc oxide nanoparticles in destroying the bacteria has considerable applications. Due to the presence of zinc oxide nanoparticles inside the polymeric network of the yarn, the rate of releasing nanoparticle is very low; so the long-term antibacterial effect of this product is considerable.

## Application

- Production of antibacterial textiles





### Advantage of Using Nanotechnology

Zinc oxide has antibacterial properties, and reduction of the particle size up to the nanometer range because of creating high surface area further improves the antibacterial effect. The antibacterial property of this product was evaluated by ISIRI 11070.

ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Sirjan Nano Yarn & Granule Complex
Website	<a href="http://www.sirjannano.com">www.sirjannano.com</a>
Email	<a href="mailto:info@sirjannano.com">info@sirjannano.com</a>



Tehran Zar Nakh



# Antibacterial Polyamide Yarn



## Introduction

This product is polyamide yarn containing silver nanoparticles. The use of silver in the production of textiles has contributed to the development of health care. To reduce the body odor, the formation of microorganisms in sweat should be prevented. Silver has antibacterial properties; and silver nanoparticles because of high diffusion rate can destroy microorganisms. Unlike other similar products, in this one the silver nanoparticles are placed inside the texture of the yarn rather than its surface. This advantage results in the slow release of the silver and therefore the long-term antibacterial properties. The clothing and textiles produced using this yarn are as follows:

- Sport pants
- Women tops
- Women T-shirt
- Gloves
- Socks
- Compression Socks
- Towel
- Men's underwear
- Pillowcase
- Bedsheet
- Blanket



### Application

- Production of antibacterial textiles and clothing such as gloves, tops, t-shirts, socks, etc.



### Advantage of Using Nanotechnology

Silver is an effective antibacterial agent which in the form of nanoparticle is highly diffusible, insofar as it allows the chemical reactions to occur at a high rate. The specific surface area and dispersion capability of silver nanoparticles cause better contact with microorganisms which consequently improves the antimicrobial activities. The antibacterial property of this product was evaluated by ISIRI 11070.

ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



### Certificates and Standards

- NanoScale Certification
- Health approval of Food and Drug Administration

### About Company

Name of Company	Tehran Zar Nakh
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# Antibacterial Polyester Yarn



## Introduction

Polymers can be easily infected by bacteria or fungi, which consequently results in the transmission of diseases and severe infections. Prevention of microbial colonization onto the polymeric surfaces can be fulfilled by adding active antimicrobial agent like silver nanoparticles into the polymers. Polyester is a category of polymers that contain the ester functional group in their main chain. In comparison with other industrial fibers, polyester fibers have high tenacity, low water absorption and minimum shrinkage. This material is widely used in the clothing industry. Silver ions and its compounds are extremely lethal for a wide range of bacteria, whilst they show very low toxicity for human cells. Therefore, silver is widely used as an antibacterial agent.



## Application

- Production of antibacterial textiles



### Advantage of Using Nanotechnology

Silver is an effective antibacterial agent which in the form of nanoparticle is highly diffusible, insofar as it allows the chemical reactions to occur at a high rate. The specific surface area and dispersion capability of silver nanoparticles cause better contact with microorganisms which consequently improves the antimicrobial activities. The antibacterial property of this product was evaluated by ISIRI 11070.

ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Nafis Nakh Co.
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Email	info@nafisnakh.com



# Antibacterial Machine-made Carpet

## Introduction



Carpet is a key decorative element which provides the principles of decoration via the use of color and texture. Recently, the carpet industry has lost market share because based on the findings, covering a floor with a carpet increases the illness, asthma and allergies. The use of soft floor coverings in schools, hospitals and other health care facilities has long been controversial as carpet is thought to contribute to the presence of microorganisms in the indoor environment. Indoor air is a complex mixture of bio-aerosols and non-biological particles. Among the most important of these are human and animal occupants that shed skin scales and other fragments, mold spores, viruses, and bacteria. Two types of antimicrobial treatments exist for carpets and coatings. The first type is used in the manufacturing process. The other type is an antimicrobial additive incorporated in a treatment of the carpet fibers during manufacturing.



### Application

- In public places such as mosques, as well as children rooms



### Advantage of Using Nanotechnology

Zinc oxide has antibacterial properties, and reduction of the particle size up to the nanometer range because of creating high surface area further improves the antibacterial effect. The antibacterial property of this product was evaluated by ISIRI 11070.

ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Mashhad Carpet
Website	<a href="http://www.mashadcarpet.com">www.mashadcarpet.com</a>
Email	groupnano@yahoo.com



# Hydrophobic Shoes



## Introduction

Water ingress into shoes can lead to bad feeling of soaked feet and socks, rotting of internal components, reduction in materials strength, bacterial growth and associated bad odors, and significant increase in weight; Thus having waterproof shoes is essential. Nowadays, hydrophobic coatings are remarkably used in shoe manufacturing. Nanostructured surfaces can be designed to create specific surface properties. Today, new plasma surface processing techniques have been developed which can restructure the topography of the surface of many fibers and fabrics (nanoscale roughness) by creating functional groups that lead to enhancement of hydrophobic property.



## Application

- Waterproof shoes are essential for any wet-weather condition



### Advantage of Using Nanotechnology

Surface treatment using cold plasma process can restructure the topography of the surface of many fibers and fabrics by creating functional groups that lead to enhancement of hydrophobic property. Adsorption resistance and 2000 cycle abrasion of the product was measured by ISIRI-567-7 and ISIRI 1521.

ISIRI-567-7: Textile -Determination of fabric resistance to surface wetting  
ISIRI 1521: Textile -Determination of the abrasion resistance of fabrics by the Martindale method



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Sepanta Novin Vira
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# Antibacterial Shoe Insoles

## Introduction



By increasing the importance of foot health, the silver nanoparticles have brought many benefits to the consumers. When feet perspire, bacteria thrive in the damp fibers and where bacteria thrive, odor thrives too. Since the health of feet depends on the shoes, experts are making the best functional insole using silver nanoparticles with the basis of well-balanced management in health and function. The odor-free insoles are healthier than normal ones. Such insoles do not cause any allergic reaction; besides, they are free from substances that are harmful to the human body. When silver nanoparticles contact with bacteria and fungi, they adversely affect cellular metabolism and inhibit cell growth and they finally kill them to almost 100%. Since the antimicrobial substance is mixed into the polymer, its function is durable throughout the lifetime of the footwear. The products of this company are as follows:

- Silicone Foot Insoles (Pabepa)
- Magnetic Massage Foot Insoles (Pabepa)
- Silicone Heel pad (Pabepa)



### Advantage of Using Nanotechnology

The silver antibacterial activity remarkably increases with size reduction up to nanometer scale, in a way that they can kill more than 650 bacterial species. By decreasing particle size, the release of silver ions increases, which as a result improves antibacterial activity. Determining the antibacterial activity of this product was carried out by ISIRI 10900.

ISIRI 10900: Evaluation of antibacterial activity on plastic and other non-porous surfaces



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Amin Soat Production Company
Website	<a href="http://www.pabepa-co.ir">www.pabepa-co.ir</a>
Email	amin_rastifar@yahoo.com



# Antibacterial Socks



## Introduction

When feet perspire, bacteria thrive in the damp fibers and where bacteria thrive, odor thrives too. Therefore, socks are good places for growth of bacteria and creation of diseases. Wearing antibacterial socks can prevent foot-related infections and diseases. By increasing the importance of foot health, the socks containing silver nanoparticles have brought many benefits to the consumers. Nanoparticles including silver and zinc oxide nanoparticles eliminate the bacteria, and consequently remove the bad smells.



## Advantage of Using Nanotechnology

Silver and zinc oxide nanoparticles are strong antibacterial agents which can eliminate a wide range of germs and bacteria. The specific surface area and dispersion capability of these nanoparticles cause better contact with micro-organisms which consequently improves the antimicrobial activities. The antibacterial property of these products was evaluated by ISIRI 11070. ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



## Certificates and Standards

- NanoScale Certification

**About Company****Name of Company**

Michka Arya Posh

**Website**[www.michkaco.com](http://www.michkaco.com)**Email**

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Michka Arya Posh

**About Company****Name of Company**

Pishtaz Monfared Nasaji

**Website**[www.moorcheh-socks.com](http://www.moorcheh-socks.com)**Email**

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Pishtaz  
Monfared  
Nasaji**About Company****Name of Company**

Mahyar Clothing

**Website**[www.mahyarco.com](http://www.mahyarco.com)**Email**

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Mahyar  
Clothing**About Company****Name of Company**

Bafandegi Pa ara

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paara.socks@gmail.com



Pa-Ara Socks

**About Company****Name of Company**

Kaspian Socks

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کاسپیان  
پوشک**About Company****Name of Company**

Pama

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Baniyan Azar  
Novin Ideal

جوله آزاد آزار



# Alaleh Azar Antibacterial Towel

## Introduction



With growth in world population and the spread of disease, the number of antibiotic resistant microorganisms is rising along with the occurrence of infections from these microorganisms. By raising the health awareness, some people have focused their attention on educating and protecting themselves against harmful pathogens. In the textile industry, it soon became more important for antimicrobial finished textiles to protect the wearer from bacteria than it was to simply protect the garment from fiber degradation. The need for antimicrobial textiles goes hand-in-hand with the rise in resistant strains of micro-organisms. Towel picks up allergens, germs, and bacteria, locking them deep within the textile's fibers. By addition of silver, the silver ions attack the bacteria inside the texture and prevent their growth.



### Advantage of Using Nanotechnology

Silver nanoparticle is a strong antibacterial agent which can eliminate a wide range of germs and bacteria. The specific surface area and dispersion capability of silver nanoparticles cause better contact with microorganisms which consequently improves the antimicrobial activities. The antibacterial property of this product was evaluated by ISIRI 11070. ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Baniyan Azar Novin Ideal
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Isfahan Golkam  
Production



# Antibacterial Bedsheet & Pillowcase



## Introduction

These products are made of cotton-polyamide fabrics, in which the fabric has been produced by using polyamide yarns containing silver nanoparticles. The use of silver in the manufacture of textiles has contributed to the development of health care. Silver is an antibacterial agent and silver nanoparticles because of having high penetration capability can eliminate microorganisms. Hospital beds are considered as perfect places for growth and proliferation of the bacteria and fungi. Therefore, the use of antibacterial bedsheets and pillowcases is a suitable way to reduce the transmission of bacteria to the patients, hospital staff and so forth.



### Advantage of Using Nanotechnology

Silver nanoparticle is a strong antibacterial agent which can eliminate a wide range of germs and bacteria. The specific surface area and dispersion capability of silver nanoparticles cause better contact with microorganisms which consequently improves the antimicrobial activities. The antibacterial property of this product was evaluated by ISIRI 11070. ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Isfahan Golfam Production
Website	<a href="http://www.golfamtex.com">www.golfamtex.com</a>
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# Antibacterial Towel

## Introduction



All people for their daily life activities such as physical exercise, bath, etc., need towel to dry their bodies. On the other hand, the common towels during normal activities are in the face of humidity and body sweat; therefore, complications from the growth and proliferation of a variety of microorganisms, in addition to creating bad odors in the towel, cause a variety of allergies and fungal diseases in the skin, especially in some sensitive points. Thus, the creation of antibacterial properties in the towels can to some extent prevent the transmission and spread of diseases.

## Advantage of Using Nanotechnology



Silver nanoparticle is a strong antibacterial agent which can eliminate a wide range of germs and bacteria. The specific surface area and dispersion capability of silver nanoparticles cause better contact with microorganisms which consequently improves the antimicrobial activities. The antibacterial property of this product was evaluated by ISIRI 11070. ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Kaspian Socks
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Email	<a href="mailto:info@caspersocks.ir">info@caspersocks.ir</a>



# Antibacterial Men's Underwear

## Introduction



The microorganism's growth on textiles causes a range of undesirable effects, not only on the textile itself, but also on the user. These effects include the generation of unpleasant odor, reduction in mechanical strength, stains and discoloration and an increased likelihood of user contamination. The men's underwear due to the direct contact with the skin, are one of the most important factors in creating skin diseases such as sensitivity, fungus, burning and skin irritation. Therefore, due to the growing public health awareness of the pathogenic effects, over the past few years, intensive research and development have been promoted to minimize or even eliminate microbe's growth on textiles. Metal nanoparticles are actually presented as an alternative for this issue, as they present a higher surface area and can dissolve faster in a given solution when compared to larger particles, releasing therefore a higher amount of metal ions and presenting a stronger antimicrobial effect.



### Advantage of Using Nanotechnology

Metal nanoparticles present a higher surface area and can dissolve faster in a given solution when compared to larger particles, releasing therefore a higher amount of metal ions and presenting a stronger antimicrobial effect. Determining the antibacterial activity of this product was carried out by INSO 11070.

INSO 11070: Textiles- Determination of antibacterial activity of textile products



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Kian Tan Poosh
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# Antibacterial Machine-made Carpet



## Introduction

Carpet is a key decorative element which provides the principles of decoration via the use of color and texture. Recently, the carpet industry has lost market share because based on the findings, covering a floor with a carpet increases the illness, asthma and allergies. The use of soft floor coverings in schools, hospitals and other health care facilities has long been controversial as carpet is thought to contribute to the presence of micro-organisms in the indoor environment. Indoor air is a complex mixture of bio-aerosols and non-biological particles. Among the most important of these are human and animal occupants that shed skin scales and other fragments, mold spores, viruses, and bacteria.



## Application

- In public places such as mosques, as well as children rooms



### Advantage of Using Nanotechnology

The silver antibacterial effect remarkably increases with size reduction up to nanoscale, in a way that they can kill more than 650 bacterial species. By decreasing particle size, the release of silver ions increases, which as a result improves antibacterial activity. Determining the antibacterial activity of this product was carried out by ISIRI 11070.

ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



### Certificates and Standards

- NanoScale Certification

### About Company

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# Benita Antibacterial Chador

## Introduction

Chador is one of the traditional coverings in our country, Iran, and other Islamic societies. Like other clothes, it can be a place for the growth of microorganisms and bacteria. For this reason, the use of antibacterial agents in the texture the clothes, especially the chador, will help to prevent the spread of microorganisms and bacteria. A group of antibacterial agents that recently considered by manufacturers in various industries are nanoparticles with antibacterial properties. Amongst them, silver nanoparticles have the potential to eliminate a large number of bacteria and fungi. The above mentioned company has used antibacterial nanoparticles in its products and introduced a variety of chadors with antibacterial properties into the market.

## Application

- As an outer garment worn by women in Islamic societies



### Advantage of Using Nanotechnology

Silver is an effective antibacterial agent which in the form of nanoparticle is highly diffusible, insofar as it allows the chemical reactions to occur at a high rate. The antibacterial property of this product was evaluated by ISIRI 11070.

ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Pajoooheshi Farhangi Hejaboefaf
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# Highno Antibacterial Textiles



## Introduction

With growth in world population and the spread of disease, the number of antibiotic resistant microorganisms is rising along with the occurrence of infections from these microorganisms. By raising the health awareness, some people have focused their attention on educating and protecting themselves against harmful pathogens. In the textile industry, it soon became more important for antimicrobial finished textiles to protect the wearer from bacteria than it was to simply protect the garment from fiber degradation. The need for antimicrobial textiles goes hand-in-hand with the rise in resistant strains of micro-organisms. By addition of silver, the silver ions attack the bacteria inside the texture and prevent their growth. The products of this company are as follows:

- Towel
- Socks
- Gloves



### Advantage of Using Nanotechnology

Silver nanoparticle is a strong antibacterial agent which can eliminate a wide range of germs and bacteria. The specific surface area and dispersion capability of silver nanoparticles cause better contact with microorganisms which consequently improves the antimicrobial activities. The antibacterial property of this product was evaluated by ISIRI 11070. ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Pishran Nassaji Ayandeh
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# Antibacterial Man-made Carpet

## Introduction



Germs, bacteria and microorganisms are the main causes of diseases, infections and bad odors. The average amount of bacteria found in a homeowner's carpet is 200,000 organisms per square inch. This amount is 4,000 times more than that found on an average homeowner's toilet seat. Therefore, the use of disinfectants that can reduce the activity of these organisms can be important. In this regard, the antimicrobial activity of silver has been proven, and it has been used in many applications. The present product is an antibacterial carpet containing silver nanoparticles which prevents creation of bad odors in carpet.

## Application

- Particularly in houses and resort centers such as mosques, etc.



### Advantage of Using Nanotechnology

Silver nanoparticle is a strong antibacterial agent which can eliminate a wide range of germs and bacteria. The specific surface area and dispersion capability of silver nanoparticles cause better contact with microorganisms which consequently improves the antimicrobial activities. The antibacterial property of this product was evaluated by ISIRI 11070. ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



### Certificates and Standards

- NanoScale Certification
- Health approval of Food and Drug Administration

### About Company

Name of Company	Yadegar kohan Jey Carpet
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Yas Sepid Mashhad  
Towel



# Selin Antibacterial Towel



## Introduction

The towel because of frequent contact with the hands and its permanent wetness can be a desirable place for the growth of bacteria. The use of antibacterial towels can be considered as an appropriate solution to avoid harmful effects of bacteria. Antibacterial towels pick up allergens, germs, and bacteria, locking them deep within the textile's fibers. In this product, zinc oxide nanoparticles act as the antibacterial agents and prevent the growth of bacteria.



## Advantage of Using Nanotechnology

Zinc oxide has antibacterial properties, and reduction of the particle size up to the nanometer range because of creating high surface area further improves the antibacterial effect. The antibacterial property of this product was evaluated by ISIRI 11070.

ISIRI 11070: Textile, Evaluation of antibacterial activity in textile products



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Yas Sepid Mashhad Towel
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# **Agriculture and Food Industry**

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- Biodegradable and Resistant Plastic Bag
- Resistant Plastic Bag
- Rat Poison (SHOCKBOOM)

# Antibacterial

## Biodegradable and Tear Resistant Plastic Bag



### Introduction

Today plastic bags have many applications in everyday life. One of the required properties for these bags is tear resistance, to the extent that they will be able to carry the weights without being torn. Plastic bags cause environmental contamination because they are not biodegradable. Due to the attempts of some environmentalist and governmental organizations, the idea of producing environmentally friendly and degradable plastic bags has attracted a lot of attention. However, the main problem is that the biodegradable bags do not have desirable tensile strength; by using nanotechnology in the production of biodegradable bags reinforced by nanoparticles this issue can be obviated



### Application

- In a wide range of applications, including groceries, supermarkets, etc.



### Advantage of Using Nanotechnology

Use of nanoparticles in the production of this product improves the tensile strength which consequently facilitates carry of the greater weights. The evaluation of tensile properties of this product was carried out by ASTM D882.

ASTM D882: Standard Test Method for Tensile Properties of Thin Plastic Sheeting



### Certificates and Standards

○ NanoScale Certification

### About Company

Name of Company	Green Environment Nano Aras
Email	greennano.aras@gmail.com



# Tear Resistant Plastic Bag



## Introduction

Today plastic bags have many applications in everyday life. One of the required properties for these bags is tear resistance, to the extent that they will be able to carry the weights without being torn. The polymer materials used to produce these bags create environmental pollution, so less use of these materials is taken into consideration. This product is a resistant plastic bag manufactured with the aid of nanotechnology, with a lower thickness and higher strength to carry heavy weights. The use of nanotechnology in the production process reduces the consumption of polymer materials which decreases the manufacturing cost.



## Application

- In a wide range of applications, including groceries, supermarkets, etc.



### Advantage of Using Nanotechnology

Use of nanoparticles in the production of this product improves the tensile strength which consequently facilitates carry of the greater weights. The evaluation of tensile properties of this product was carried out by ASTM D882.

ASTM D882: Standard Test Method for Tensile Properties of Thin Plastic Sheeting



### Certificates and Standards

○ NanoScale Certification

### About Company

Name of Company	Green Environment Nano Aras
Email	greennano.aras@gmail.com



# Nontoxic Rat Poison (SHOCKBOOM)



## Introduction

Finding mice in your home or business can be very distressing. Mice are known to spread disease as they search the house for food and shelter. This poses great health risks particularly in kitchens or where children might play. The natural and constant gnawing habit of mice means they can also cause damage to the property, furnishings and equipment. There are some ways to eliminate mice. The most common ones are trapping and poisons. Using various poisons gives rise to serious damage to underground and surface water sources. They also may cause human poisoning or death in pets through eating them by mistake. Hence, it is very remarkable for researchers to produce nontoxic mice repellent.



## Application

- Killing different species of mice
- It is widely used in farms, gardens and storage places for food and perishable materials



### Advantage of Using Nanotechnology

This product contains spherical nanoparticles with the average particle size of 48 nm. High surface to volume ratio and consequently high chemical reactivity of nanoparticles give rise to the further efficiency of the product.



### Certificates and Standards

- NanoScale Certification
- Iran Ministry of Health Safety Certification
- Plant Protection Organization Certification

### About Company

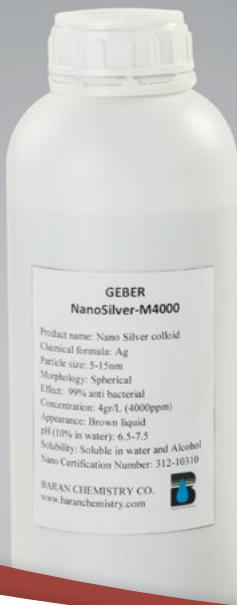
Name of Company	Rayan Zarin Sina
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# Nanomaterials

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- Colloidal Silver Nanoparticles-4000 ppm
- Nanostructured Silica Powder
- Boehmite Powder
- Colloidal Silica 15 wt%
- Colloidal Silica 25 wt%
- Nanostructured Silica Powder
- Colloidal Silver Nanoparticles
- Colloidal Silver Nanoparticles-4000 ppm
- Nanostructured Gamma-Alumina Powder
- Silica Nanocolloid
- Anostructured Carbonated Hydroxyapatite Powder
- Biodegradable Compound
- Silica Aerogel Silica Aerogel



# Colloidal Silver Nanoparticles-4000 ppm



## Introduction

Colloidal silver is a mineral solution containing silver ions and small charged particles which are suspended in a liquid medium. When the particles have the same electrostatic charges, they repel each other; this creates a uniform suspension of particles throughout the medium. Although silver ions are important, a 100% solution of silver ions is not colloidal silver. Various names have been used to describe colloidal silver, such as silver sols. Sometimes colloidal silver is also called Nano Silver, which contains particles in the range of 1 to 100 nm.



## Application

- In biosensors and diagnostic tools as biological tags for quantitative diagnosis
- In conductive inks for improving thermal and electrical conductivity
- In apparel, footwear, paints, wound dressings, appliances, cosmetics, and plastics because of having antibacterial effect



### Advantage of Using Nanotechnology

Silver nanoparticles are stabilized easily in nano-dimension which leads to the formation of more stable colloids. It could be mentioned that in nano-dimension, antibacterial effect of silver increases significantly, so that they are able to remove over 650 bacterial species.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Baran Chemistry Pasargad
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Email	salco.ex@gmail.com



# Nanostructured Silica Powder



## Introduction

Silicon dioxide, also known as silica, is a chemical compound that is an oxide of silicon with the chemical formula  $\text{SiO}_2$ . Recently, silica nanoparticles have occupied an important position in scientific research, because of their easy preparation and their wide uses in various industrial applications, such as catalysis, pigments, pharmacy, electronic and thin film substrates, electronic and thermal insulators, and humidity sensors. The silica particles play a different role in each of the above applications; the quality of these products is highly dependent on the size and size distribution of the particles.



## Application

- In paint and coating industries as matting and thixotropic agent.
- In rubber compounds nano silica can be replaced with carbon black in lower dosing amounts.
- In concrete formulation acts as a very active pozzolan and creates better covalence bonds in final concrete.
- In ceramics (sugar) porcelain, gypsum, batteries, paints, adhesives, cosmetics, glass, steel, fiber, glass, etc.



### Advantage of Using Nanotechnology

The silica nanoparticles produced by this company has average particle size of 20-30 nm. The main advantage of silica nanoparticles is its high surface area which causes more interaction with other materials.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Fadak Advanced Technology Complex
Website	<a href="http://www.fadakgroup.ir">www.fadakgroup.ir</a>
Email	info@fadakgroup.ir



# Boehmite Powder



## Introduction

Boehmite is an aluminum oxide hydroxide ( $\text{AlOOH}$ ) mineral, a component of the aluminum ore bauxite. It is dimorphous with diaspore. It crystallizes in the orthorhombic dipyramidal system and is typically massive in habit. It is white with tints of yellow, green, brown or red due to impurities. It has a vitreous to pearly luster, a Mohs hardness of 3 to 3.5



## Application

- As catalyst, membranes, refractories and abrasives, adsorbents, and vaccine supplements
- As a precursor in the synthesis of various types of alumina phases



### Advantage of Using Nanotechnology

The average pore size of Bohemian powder according to the BET and BJH analyses was 28.13 and 53.3 nanometer, respectively. Moreover, the specific surface area was 180 and 215 m<sup>2</sup>/g, respectively.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	IMIDRO
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Isatis Nano Silica



# Colloidal Silica 15 wt%

## Introduction



Colloidal silicas are suspensions of fine amorphous, nonporous, and typically spherical silica particles in a liquid phase. The liquid is denser than water and has been stabilized electrostatically to allow the particles to stay suspended in the solution. There are many grades of colloidal silica, but all of them are composed of silica particles ranging in size from about 3 nm up to about 150 nm. These particles may be spherical or slightly irregular in shape, and they may be present as discrete particles or slightly structured aggregates. These particles may also be present in a narrow or wide particle size range- depending on the process in which they were created.

## Application

- Surface treatment in the paper industry
- As a polishing agent in the electronics industry
- As a common additive in cosmetics and food industry
- As an additive for varnishes, coatings and paints



### Advantage of Using Nanotechnology

The main advantage of silica nanoparticles is its high specific surface area which causes more interactions. Silica particles are easily stabilized in nano-dimension and promote the formation more stable colloid.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Isatis Nano Silica
Website	<a href="http://www.isatissilica.com">www.isatissilica.com</a>
Email	vahideslami70@yahoo.com



Isatis Nano Silica



# Colloidal Silica 25 wt%

## Introduction



Colloidal silicas are suspensions of fine amorphous, nonporous, and typically spherical silica particles in a liquid phase. The liquid is denser than water and has been stabilized electrostatically to allow the particles to stay suspended in the solution. There are many grades of colloidal silica, but all of them are composed of silica particles ranging in size from about 3 nm up to about 150 nm. These particles may be spherical or slightly irregular in shape, and they may be present as discrete particles or slightly structured aggregates. These particles may also be present in a narrow or wide particle size range- depending on the process in which they were created.

## Application

- Surface treatment in the paper industry
- As a polishing agent in the electronics industry
- As a common additive in cosmetics and food industry
- As an additive for varnishes, coatings and paints



### Advantage of Using Nanotechnology

The main advantage of silica nanoparticles is its high specific surface area which causes more interactions. Silica particles are easily stabilized in nano-dimension and promote the formation more stable colloid.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Isatis Nano Silica
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Email	vahideslami70@yahoo.com



# Nanostructured Silica Powder



## Introduction

Advancement in nanotechnology has led to the production of nanosized silica,  $\text{SiO}_2$ , which has been widely used as reinforcement in engineering composite. The silica particles extracted from natural resources contain metal impurities and are not suitable for advanced scientific and industrial applications. Thus, focus is given to synthetic silica (colloidal silica, silica gels, pyrogenic silica, and precipitated silica), which is pure and produced mostly in amorphous powder forms compared to natural mineral silica (quartz, tridymite, cristobalite) which is in crystalline forms. Some of the widely used methods to synthesize silica nanoparticles are ion exchange and flame synthesis.



## Application

- Reinforcing cement-based materials in construction and building
- As a filler or reinforcement in production of polymer nanocomposites in order to improve thermal, mechanical, physical and chemical properties
- An interesting material as stationary phases for high performance liquid chromatography



### Advantage of Using Nanotechnology

The main advantage of silica nanoparticles is its high specific surface area which causes more interactions.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Isatis Nano Silica
Website	<a href="http://www.isatissilica.com">www.isatissilica.com</a>
Email	vahideslami70@yahoo.com



# Colloidal Silver Nanoparticles



## Introduction

Colloidal silver is a mineral solution containing silver ions and small charged particles which are suspended in a liquid medium. When the particles have the same electrostatic charges, they repel each other; this creates a uniform suspension of particles throughout the medium. Although silver ions are important, a 100% solution of silver ions is not colloidal silver. Various names have been used to describe colloidal silver, such as silver sols. Sometimes colloidal silver is also called Nano Silver, which contains particles in the range of 1 to 100 nm.



## Application

- Production of antibacterial polyester fibers for textiles



### Advantage of Using Nanotechnology

Silver nanoparticles are stabilized easily in nano-dimension which leads to the formation of more stable colloids. It could be mentioned that in nano-dimension, antibacterial effect of silver increases significantly, so that they are able to remove over 650 bacterial species. Antibacterial effect of this product was evaluated by ISIRI 11070 standard.

ISIRI 11070: Inspection of antibacterial effect in textiles



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Mehrab Exir Chemical Industries
Website	<a href="http://www.mehrabexir.com">www.mehrabexir.com</a>
Email	<a href="mailto:info@mehrabexir.com">info@mehrabexir.com</a>



## Colloidal Silver Nanoparticles-4000 ppm



### Introduction

Colloidal silver is a mineral solution containing silver ions and small charged particles which are suspended in a liquid medium. When the particles have the same electrostatic charges, they repel each other; this creates a uniform suspension of particles throughout the medium. Although silver ions are important, a 100% solution of silver ions is not colloidal silver. Various names have been used to describe colloidal silver, such as silver sols. Sometimes colloidal silver is also called Nano Silver, which contains particles in the range of 1 to 100 nm.



### Application

- In biosensors and diagnostic tools as biological tags for quantitative diagnosis
- In conductive inks for improving thermal and electrical conductivity
- In apparel, footwear, paints, wound dressings, appliances, cosmetics, and plastics because of having antibacterial effect



### Advantage of Using Nanotechnology

Silver nanoparticles are stabilized easily in nano-dimension which leads to the formation of more stable colloids. It could be mentioned that in nano-dimension, antibacterial effect of silver increases significantly, so that they are able to remove over 650 bacterial species.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Nano Mad
Website	<a href="http://www.nanomad.co">www.nanomad.co</a>
Email	info@nanomad.co



# Nanostructured Gamma-Alumina Powder



## Introduction

This product is mesoporous gamma alumina which has been produced by Hydroxy-gel method. Highly pure nano gamma alumina has a compact crystal structure, excellent mechanical strength, and high thermal and chemical stability. It has many applications in electronics, optoelectronics, refractory industry, petroleum and petrochemical industries as catalyst and catalyst support.



## Application

- Catalyst support



### Advantage of Using Nanotechnology

The high surface area of gamma-phase nanoparticles causes appropriate catalytic activity.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Nano Pars Spadana
Website	<a href="http://www.nanops.ir">www.nanops.ir</a>
Email	<a href="mailto:info@nanops.ir">info@nanops.ir</a>



# Silica Nanocolloid



## Introduction

Colloidal silicas are suspensions of fine amorphous, nonporous, and typically spherical silica particles in a liquid phase. The liquid is denser than water and has been stabilized electrostatically to allow the particles to stay suspended in the solution. There are many grades of colloidal silica, but all of them are composed of silica particles ranging in size from about 3 nm up to about 150 nm. These particles may be spherical or slightly irregular in shape, and they may be present as discrete particles or slightly structured aggregates. These particles may also be present in a narrow or wide particle size range- depending on the process in which they were created.



## Application

- Surface treatment in the paper industry
- As a polishing agent in the electronics industry
- As a common additive in cosmetics and in the food industry
- As an additive for varnishes, coatings and paints



### Advantage of Using Nanotechnology

The main advantage of silica nanoparticles is its high specific surface area which causes more interactions. Silica particles are easily stabilized in nano-dimension and promote the formation more stable colloid.



### Certificates and Standards

- NanoScale Certification

## About Company

Name of Company

Padideh Shams Iranian



# anostructured Carbonated Hydroxyapatite Powder

## Introduction



Nanostructured Carbonated Hydroxyapatite Powder, produced in body simulator system, has provided the ability of formation of high surface area with the target tissue. Hydroxyapatite (HA) with the chemical formula of  $\text{Ca}_5(\text{PO}_4)_3(\text{OH})$  is widely used in medical fields such as treatment of bone defects and bone tissue regeneration due to its biocompatible and bioactive nature. Biological apatite as the inorganic part of bone and teeth tissue has a nanometric structure. Therefore, the high performance of nanostructured hydroxyapatite with phase composition similar to that of biological apatite is ensured.

## Application



- Non-medical applications include catalyst, ion removal from industrial wastewaters, column chromatography and gas sensors
- Medical applications include orthopedic (bone cement and bone tissue engineering), coating of implants, dentistry, drug delivery systems, and biosensors



### Advantage of Using Nanotechnology

Hydroxyapatite sheets smaller than 30 nm in thickness are formed on the surface of powder. These nanostructured surfaces provide large surface area between bone tissues and powder surface.



### Certificates and Standards

- NanoScale Certification

### About Company

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# Biodegradable Compound

## Introduction



Petroleum resources are limited and the excessive use of non-biodegradable polymers has caused serious environmental problems. Therefore, degradable and/or biodegradable polymers have received more attention these days. Since synthetic polymers are expensive, the focus is mainly on natural polymers which are inherently biodegradable and can be promising candidates to meet different requirements. Among the natural polymers, starch is of main interest. It is regenerated from carbon dioxide and water by photosynthesis in plants. Due to its complete biodegradability, low cost, and renewability, starch is considered as a promising candidate for developing sustainable materials. Addition of starch to the synthetic polymers creates biodegradable feature but decreases mechanical properties. To deal with this problem, nanofibers are added to the polymers.

## Application

- As usable polymer films in disposable tablecloths, nylon, etc.



### Advantage of Using Nanotechnology

Addition of nanofibers to the polymers leads to the improvement of mechanical and chemical properties. Determination of biodegradability of the product was performed using ISO 14855-2.



### Certificates and Standards

- NanoScale Certification

### About Company

Name of Company	Parsa Polymer Sharif
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# Silica Aerogel

## Introduction



Aerogels are transparent foams, with high porosity, open pores and low density which have nano-scale pores. These features have led to properties such as low thermal conductivity, low sound velocity and thus function as acoustic insulation, low dielectric coefficient and high optical permittivity. This product gains hydrophobic properties due to chemical modification with an organic material.

## Application

- Additive in manufacture of hot and cold insulating blankets
- Additive in fabrication of industrial insulating paints such as acrylic and epoxy
- Filler in soundproof and thermal insulating glasses
- Usable as hydrophobic materials



## Advantage of Using Nanotechnology

Silica Aerogels are mesoporous materials. Because of porosity and nanometer pore size, silica aerogels are highly insulating with thermal conductivity even lower than air. Due to the high specific surface area, the functionalized aerogels show better hydrophobic properties.



## Certificates and Standards

- NanoScale Certification

## About Company

Name of Company	Vakonesh Sanat-e Part
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Email	info@vaspart.com



# Nanotechnology Platforms

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- Nanofiber
- NanoCoating
- Plasma Technology



# Nanofiber

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- NanoFiber Introduction
- Industrial Nanofiber Production Line (INFL)
- Pilot Electrospinning Machine
- Lab-scale Electrospinning Unit
- Dip Electrospinning Unit
- Nanofiber Mass Production Line
- Multi Option Electrospinning Machine
- Lab Electrospinning Unit

# Nanofibers

Nanofibers have emerged as exciting one-dimensional nanomaterials for a broad spectrum of research and commercial applications owing to their unique physicochemical properties and characteristics. As a class of nanomaterials with cross-sectional diameters ranging from tens to hundreds of nanometers, nanofibers possess extremely high specific surface area and surface area-to-volume ratio. They are capable of forming networks of highly porous mesh with remarkable interconnectivity between their pores, making them an attractive choice for a host of advanced applications. In fact, the significant impact of nanofiber technology can be traced from the wide range of fundamental materials that can be used for the synthesis of nanofibers. These include natural polymers, synthetic polymers, carbon-based materials, semiconducting materials, and composite materials. Correspondingly, the emerging proof-of-concept applications of nanofibers spanning several important areas have been rapidly reported.

Of all the current strategies available for synthesizing one-dimensional nanofibers, electrospinning is one of the most established and widely adopted techniques. In general, the electrospinning set-up consists of a syringe with a nozzle, an electric field source, a counter electrode or grounded target, and a pump. The electrospinning process is based on the principle of electrostatics in which the electrostatic repulsion forces in a high electrical field are used for nanofiber synthesis. The solution to be electrospun is held in a syringe nozzle and a large electrical field is generated between the nozzle and counter electrode. As the solution is ejected, the solution droplet at the nozzle adopts a cone-shaped deformation due to the potential difference between the nozzle and the grounded target. As the charged jet accelerates towards the counter electrode, the solvent in the solution evaporates, leading to the formation of solid continuous nanofibers on the grounded target.





# Industrial Nanofiber Production Line (INFL)



## Introduction

Industrial Nanofiber Production Line (INFL) is an industrial-scale electrospinning nanofiber production machine that can coat one meter width substrates with 60-500 nm diameter nanofibers. This production line can be offered in both needleless or needle-type e-spinning. In the needleless production line, the needleless rotary spinneret is partially immersed into the polymer solution and a high strength electric field is applied to the solution bath and collector (rotating drum). This results in the formation of numerous jets from the spinneret and consequently, the formation of a layer of nanofibers on the collector.



## Application

- Deposition of nanofiber on different substrates in large-scale.
- Production of nano-fiber based filters and face masks.



### Certificates and standards

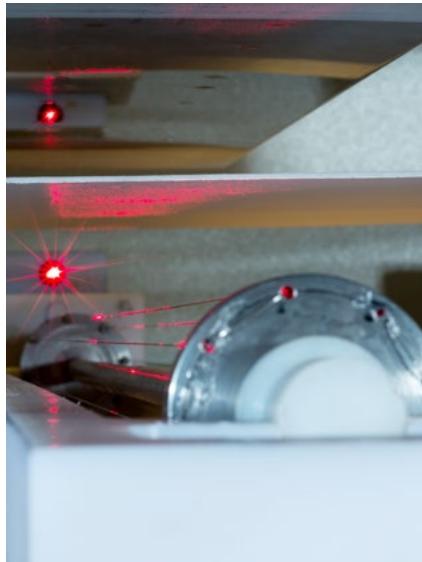
- Certificate of Nanotechnology

### About Company

Name of company	Fanavararan Nano Meghyas
Website	<a href="http://www.fnm.ir">www.fnm.ir</a>
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### Nanotechnology in Product

Using this production line, different nanofibers can be deposited on various substrates in industrial scale.



## Technical specifications

Device Model	INFL400	INFL800	INFL1000
No. of Electrospinning Units	4	6	8
Power Supply	<ul style="list-style-type: none"> <li>Single-phase, 220 V AC, 50-60 Hz</li> <li>Three-phase, 380 V AC, 50-60 Hz (customer order)</li> </ul>		
High Voltage Power Supply	<ul style="list-style-type: none"> <li>50 kV DC, Positive/ Negative Polarity</li> <li>Digital Display of Voltage with a Precision of 0.1 kV</li> <li>50 kV DC, Positive/ Negative Polarity</li> <li>Digital Display of Voltage with a Precision of 0.1 kV</li> </ul>		
Spinneret (needleless e-spinning)	<ul style="list-style-type: none"> <li>Material: steel</li> <li>Diameter: 6 cm</li> <li>Length: 30-160 cm (based on order)</li> <li>Rotation Speed: 1-20 rpm</li> </ul>		
Nozzle (needle-type e-spinning)	<ul style="list-style-type: none"> <li>Material: steel</li> <li>No. of Nozzles: 10 to 50 in each unit</li> <li>Length: 30-160 cm (based on order)</li> <li>Number: 20 to 100 in each unit</li> <li>Min. Injection Rate: 100 L/h</li> <li>Max. Injection Rate: 20 mL/h</li> </ul>		
Collector	<ul style="list-style-type: none"> <li>Material: steel</li> <li>Dimension: Depending on the spinneret dimension</li> <li>Working distance: 5-20 cm</li> </ul>		
Heating system	Ambient to 40 °C		
Control Panel	<ul style="list-style-type: none"> <li>PLC with HMI Interface</li> <li>Emergency Stop Button</li> </ul>		

**Technical specifications**

<b>Ventilation System</b>	Removing solvent from chamber using a ventilation fan with scheduled operation time
<b>Winding System</b>	<ul style="list-style-type: none"><li>• Winding Speed: up to 1000 m/h</li><li>• Max. Substrate Width: 1 m</li></ul>
<b>Chamber</b>	Metallic chamber equipped with 6 doors on side walls for easily monitoring the process
<b>Nanofiber Diameter</b>	60 to 500 nm
<b>Dimensions</b>	<ul style="list-style-type: none"><li>• L: 4 to 8 m (based on order and number of units)</li><li>• W: 1 to 2 m (based on order and units width)</li><li>• H: 2 to 2.5 m (based on order)</li></ul>
<b>Weight</b>	1500 to 3500 kg (based on order and number of e-spinning units)



# Pilot Electrospinning Machine



## Introduction

Pilot Electrospinning Machine is a semi-industrial scale electrospinning nanofiber production machine that can coat substrates with different nanofibers. This production line can be offered in both needleless or needle-type e-spinning. In the needleless production line, the needleless rotary spinneret is partially immersed into the polymer solution and a high strength electric field is applied to the solution bath and collector (rotating drum). This results in the formation of numerous jets from the spinneret and consequently, the formation of a layer of nanofibers on the collector.



## Application

- Deposition of different nanofiber on different substrates in large-scale.
- Production of nano-fiber based filters and face masks.



## Certificates and standards

- Certificate of Nanotechnology

## Technical specifications

Device Models	NFL30R3	NFL50	NFL60	NFL60R	NFL100
No. of Electrospinning Units	3	1	1	1	1
Length of Electrospinning Unit (cm)	30	50	50	60	100
Input Power	Single-phase, 220 V AC, 50-60Hz				
High Voltage Power Supply	<ul style="list-style-type: none"> <li>• 50 kV DC, Positive/ Negative Polarity</li> <li>• Digital Display of Voltage with a Precision of 0.1 kV</li> </ul>				
Spinneret (needleless e-spinning)	Material: steel / Diameter: 6 cm / Length: 20-40 cm (based on order) / Rotation Speed: 1-10 rpm				
Nozzle (needle-type e-spinning)	<ul style="list-style-type: none"> <li>• Material: steel</li> <li>• Length: 20-40 cm (based on order)</li> <li>• Number: 10 to 50 in each unit</li> <li>• Min. Injection Rate: 100 L/h</li> <li>• Max. Injection Rate: 20 mL/h</li> </ul>				
Collector	<ul style="list-style-type: none"> <li>• Material: Anti-acid steel</li> <li>• Working distance: 5-20 cm</li> <li>• Dimensions: Depends on the spinneret dimensions</li> </ul>				
Heating system	Ambient to 40 °C				
Control Panel	PLC with HMI Interface / Emergency Stop Button				
Ventilation System	Removing solvent from chamber using a ventilation fan with scheduled operation time				
Winding System	Winding Speed: up to 250 m/h (based on order)				
Chamber	Metallic chamber equipped with 6 doors on side walls for easily monitoring the process				
Dimensions	<ul style="list-style-type: none"> <li>• L: 100 to 200 cm (based on order and number of units)</li> <li>• W: 80 to 120 cm (based on order and units width)</li> <li>• H: 120 to 180 cm (based on order)</li> </ul>				
Weight	100 to 600 kg (based on order and number of e-spinning units)				

## About Company

Name of company	Fanavararan Nano Meghyas
Website	<a href="http://www.fnm.ir">www.fnm.ir</a>
Email	info@fnm.ir

## Nanotechnology in Product

Using this production line, different nanofibers can be deposited on various substrates in pilot scale.



# Lab-scale Electrospinning Unit



## Introduction

The Lab-scale Electrospinning Unit is the laboratory electrospinning equipment for efficient research and experimental work in the field of nanofibers. This system makes use of electrostatic and mechanical force to spin fibers from the tip of a fine spinneret. The spinneret is maintained at a positive or negative charge by a DC power supply. When the electrostatic repelling force overcomes the surface tension force of the polymer solution, the liquid spills out of the spinneret and forms an extremely fine continuous nanofiber.



## Application

- Experimental work and product development in academic, research and industrial spheres.
- Simultaneous electrospinning of two different materials for production of composite nanofibers suitable for pharmaceutical, medicinal, biological, etc. applications.



## Certificates and standards

- Certificate of Nanotechnology

## Technical specifications

Device Models	ES1000	ES2000
Dimensions (L×W×H) cm	65×70×80	70×115×85
Weight (kg)	80	110
Syringe Pump	1 syringe pump on one side of collector	2 syringe pumps on both sides of collector
No. of Scanning System	1	2
Scanning Rate (mm/min)	0-2500	
Scanning Range (cm)	0-30	
Nozzles	<ul style="list-style-type: none"> <li>• No. of attachable needle: Max. 2 needles (up to 10 needles base on order)</li> <li>• Configuration: Horizontal (no need for hose and fitting)</li> <li>• Injection Rate: 10 L/h to 100 mL/h</li> <li>• Injection Mode: Continuous or Confined</li> </ul>	
Input Power	Single-phase, 220 V AC, 50-60Hz	
High Voltage Power Supply	<ul style="list-style-type: none"> <li>• 0-35 kV (ES2000 Model equipped with 2 HV power supplies)</li> <li>• Digital Display of Voltage with a Precision of 0.1 kV</li> </ul>	
Collector	<ul style="list-style-type: none"> <li>• Material: Steel or Aluminum</li> <li>• Shape: Plate or Drum</li> <li>• Diameter: 8 cm</li> <li>• Working distance: 5-20 cm</li> <li>• Rotation speed: 200 to 3000 rpm</li> </ul>	
Heating system	Ambient to 40 °C	
Control Panel	PLC with HMI Interface	
Ventilation System	Removing solvent from chamber using a ventilation fan with scheduled operation time	
Chamber	Metallic chamber equipped with 3 glass doors on three sides for easily monitoring the electrospinning process	

## About Company

Name of company	Fanavararan Nano Meghyas
Website	<a href="http://www.fnm.ir">www.fnm.ir</a>
Email	info@fmn.ir

## Nanotechnology in Product

The Lab-scale electrospinning unit is an efficient tool for research and development in the field of nanofibers. The dual-pump model can also be used for the synthesis of composite nanofibers which are suitable for pharmaceutical, medicinal, and biological applications.



# Dip Electrospinning Unit



## Introduction

Dip electrospinning unit (needleless electrospinning) is a large-scale nanofiber producer machine. Unlike conventional electrospinning which uses needle and syringe pump for nanofiber production, in this system, a rotary spinneret is immersed into the polymer solution bath and a high strength electric field is applied to the solution bath and collector. This results in the formation of numerous jets from the spinneret and the nano-fibers form on a collector.



## Application

- Production of polymer/ceramic nanofibers in large quantities.



## Certificates and standards

- Certificate of Nanotechnology

## Nanotechnology in Product

Dip electrospinning is an efficient machine for production of nanofibers in large scale quantities.

## Technical specifications

Device Model	NL20	NL50	NL100
Spinneret Dimensions (D×L) cm	8×20	16×50	32×100
Solution Bath Volume	350 (mL)	750 (mL)	1500 (mL)
Dimensions (L×W×H) cm	70×70×80	125×90×95	220×130×120
Weight (kg)	120	200	300
Power Supply	Single-phase, 200-240 V AC, 50-60 Hz		
High Voltage Power Supply	0-35 kV DC, Positive/ Negative Polarity Digital Display of Voltage with a Precision of 0.1 kV		
Spinneret	<ul style="list-style-type: none"> <li>Material: stainless steel</li> <li>Shape: cylinder, disk and wire</li> <li>Diameter: 6 cm</li> <li>Rotation Speed: 2-10 rpm</li> </ul>		
Collector	<ul style="list-style-type: none"> <li>Material: stainless steel</li> <li>Shape: Flat plate or rotating drum</li> <li>Working distance: 5-20 cm</li> <li>Rotation speed: 10 to 50 rpm</li> </ul>		
Heating system	Ambient to 40 °C		
Control Panel	<ul style="list-style-type: none"> <li>PLC with HMI Interface</li> <li>Emergency Stop Button</li> </ul>		
Ventilation System	Removing solvent from chamber using a ventilation fan with scheduled operation time		
Chamber	Metallic chamber equipped with transparent glass doors on three sides for easily monitoring the electrospinning process		

## About Company

Name of company	Fanavararan Nano Meghyas
Website	<a href="http://www.fnm.ir">www.fnm.ir</a>
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# Nanofiber Mass Production Line



## Introduction

Nanofiber Mass Production Line is an industrial-scale electrospinning nanofiber production machine. This line makes use of an injection system and several electrospinning units in which each unit is independently programmable. In this process, polymer solution is delivered to an apparatus consisting of nozzles where a high voltage is used to generate nanofibers.



## Application

- Production of different nanofibers including polymer/ ceramic nanofibers.
- Production of nanofibers containing nanoparticles.
- Synthesis of nanofibers with smooth or porous surface.



## Certificates and standards

- Certificate of Nanotechnology

**Technical specifications**

Device Model	NF-Line-IV
High Voltage Power Supply (kV)	150 (with 0.5 kV accuracy)
Injection System	At least 1 injection system
No. of Spinning Units	At least 4 units in each production line (the number of units can be increased in case of the need for higher production rate)
Arrangement of Spinning Units	Changeable (adjustable based on the user requirements for production of different products)
Collector	Ability to collect nanofibers in different forms including pure nanofiber, deposited nanofibers on substrate, etc.
Working Distance (cm)	10-50
Substrate Width (cm)	15 to 200
Substrate Winding Speed (m/min)	0.1 to 2 (with 0.01 m/min accuracy)
Spinning Unit Efficiency	Max. efficiency of each unit is 1.5 g/min for one square meter of substrate
Dimensions (L×W×H) cm	140×100×160 (depends on the number of injection systems and the width of substrate)
Weight (kg)	Min. 500 (depends on the number of injection systems and the width of substrate)
Other Features	<ul style="list-style-type: none"> <li>• Equipped with solvent recycle unit</li> <li>• Ventilation system for safe removing of toxic solvents and suspended nanofibers</li> <li>• Safety-door lock switch to prevent electric shock</li> </ul>

**About Company**

Name of company	Asian Nanostructure Technology Co.
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Email	<a href="mailto:info@anstco.com">info@anstco.com</a>

**Nanotechnology in Product**

Using this production line, different nanofibers can be produced or deposited on various substrates in industrial-scale.



# Multi Option Electrospinning Machine



## Introduction

Multi Option Electrospinning Machine is a laboratory electrospinning system which is efficient for research and experimental work in the field of nanofibers. This system makes use of an automatic syringe pump to pump the fluid through a syringe. A voltage is supplied (using several kV potential) to positively charge the syringe needle. The resulting electric field causes fibers to be pulled out of the droplet at the end of the tip and onto a grounded metal collector.



## Application

- Experimental work and product development in academic, research and industrial spheres.
- Production of different nanofibers including synthetic polymer, natural and biodegradable or polymer/composite nanofibers.



## Certificates and standards

- Certificate of Nanotechnology

**Technical specifications**

Device Models	ES I	ES II	ES I-I	ES I-II	ES II-II
<b>Weight (kg)</b>	60	60	80	80	80
<b>High Voltage Power Supply</b>	0 to 35 kV DC	0 to 35 kV AC	0 to 35 kV DC	0 to 35 kV AC	0 to 35 kV DC
<b>No. of High Voltage Electrodes</b>	1	1	2	2	2
<b>No. of Independent Syringe Pumps</b>	1	2	2	3	4
<b>No. of Spinning Directions</b>	1	1	2	2	2
<b>Input Power</b>	Single-phase, 220 V AC, 50-60 Hz				
<b>Injection Rate (mL/h)</b>	0.1 to 10 (with 0.1 mL/h precision)				
<b>Collector</b>	<ul style="list-style-type: none"> <li>• Rotation Speed: 100-3000 rpm</li> <li>• Working Distance: 5-20 cm</li> </ul>				
<b>Control Panel</b>	PLC with HMI Interface				
<b>Dimensions (L×W×H)</b>	60×70×100 cm				
<b>Other Features</b>	<ul style="list-style-type: none"> <li>• Changing collector with different dimensions and even fixed collector</li> <li>• Adjustable scanning speed</li> <li>• Ability to scan on collector for uniform production</li> </ul>				

**About Company**

<b>Name of company</b>	Fanavararan Tajhizat Nanoazma Co.
<b>Website</b>	<a href="http://www.nanoazma.com">www.nanoazma.com</a>
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**Nanotechnology in Product**

Full option electrospinning machine is an efficient tool for research and development in the field of nanofibers. It can be used for the production of a wide range of nanofibers such as synthetic polymer, natural and biodegradable or polymer/composite nanofibers in lab-scale.



# Lab Electrospinning Unit



## Introduction

Lab Electrospinning Unit is a full-automatic laboratory electrospinning instrument which is able to produce different polymer nanofibers. This system makes use of electrostatic and mechanical force to spin fibers from the tip of a fine spinneret. The spinneret is maintained at a positive or negative charge by a DC power supply. When an applied electrostatic charge overcomes the surface tension of the solution, the polymer jet is formed. A rapidly rotating collector results in aligned nanofibers while stationary collector results in randomly oriented fiber mats.



## Application

- Production of a wide range of natural and synthetic polymer nanofibers.
- Electrospinning of aligned nanofibers to produce single or multilayer structures



## Certificates and standards

- Certificate of Nanotechnology

## Technical specifications

Device Model	NF COADN-VI	NF CO-ANVI	NF CO-ENVI
High Voltage Power Supply (kV)	2 units, each one 35	2 units, each one 35	2 units, each one 30
Nozzle (No. of attachable needles)	6 (max. 3 needles in each arm with min. distance of 1 cm)		2 (1 needle in each arm) Needle Size: 35 mm
Nozzle Scanning Rate (mm/min)	0 to 550 (with 5 mm/min precision)	220 (constant rate)	-
Collector	Plate type with 50 mm length Rotating Drum with diameters of 30 mm or 50 mm		Rotating Drum with diameter of 50 mm
Collector Rotation Speed (rpm)	250-2500	100-2000	100-1500
Working Distance (mm)	3-25		
Weight (kg)	215	175	180
Syringe Pump	<ul style="list-style-type: none"> <li>• 2 Independent Syringe Pumps for Injection from 2 Perpendicular Arms</li> <li>• Injection Rate: 0.1 to 5 mL/h (with 0.1 mL/h precision)</li> </ul>		
Control Panel	Touch screen panel with a designed interface software		
Dimensions (L×W×H)	95×85×180 cm		
Other Features	<ul style="list-style-type: none"> <li>• Electrospinning of aligned nanofibers</li> <li>• Safety door lock for prevention of electric shock</li> <li>• Ventilation system for removing solvent from chamber</li> </ul>		

## About Company

Name of company	Atlas Saze Aria
Email	aria410@anstco.com

## Nanotechnology in Product

Laboratory electrospinning unit is a simple, versatile technique for generating nanofibers from a rich variety of materials including polymers, composites, and ceramics. This device can also be used for the synthesis of aligned nanofibers which are suitable for especial applications.



# NanoCoating

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- Hybrid PVD System
- Wear & Erosion-resistant Super-hard Nanolayer & Nanocomposite Coatings on the Various Types of Cutting Tools
- Wear- & Corrosion-resistant Super-hard Nanolayer & Nanocomposite Coatings on the Surface of the Turbine Blades at the Low Temperature Parts
- Wear-, Erosion- & Corrosion-resistant Super-hard Nanolayer & Nanocomposite Coatings on the Surface of Different Metal Forming Moulds
- Cathodic Arc Deposition System
- Cathodic Arc & Sputtering System
- Golfa Nanocoating-Decorative Corrosion- & Scratch-resistant Nanosstructured Coatings
- Zirconium-based Nanoceramic Conversion Coating

## Introduction to Nanocoatings

An Introduction to Iran Nanocoating Development Center

Nanocoating development center is one of the subgroups of the “market and industry workgroup” that aims to promote the nanocoating technology in the domestic industries, as well as supporting the technicians in this field. This center attempts to widely develop the nanocoating technology by gathering the professors, experts and technicians in this field. The center plans to introduce itself as a superior nanotechnology center in Asia in the near future. In nutshell, some main goals of the center are as follows:

- The familiarity of the industries with the nanocoating technology and the benefits of utilizing it
- Giving advice and services to the domestic industries to solve their problems relying on the ability of the technology
- Promoting and utilizing nanocoating technology in the domestic industries
- Contribute to the development, maturity, and marketing of the technology
- Contribute to increase the productivity of the domestic industries by using the technology
- Export of machinery, technology and services to the foreign countries

## Introduction to Nanocoatings Technology

Coating technology is an engineering process in which covering the surfaces with the suitable materials makes it possible to increase the durability of the components, machines and equipment. With the advent of nanotechnology, the coating of components using this technology has been widely developed, and consequently has led to increasing the efficiency and productivity. A nanocoating can be defined as having either the thickness of the coating in nanoscale or the second phase particles that are dispersed into the matrix in the nanosize range or coatings having nanosized grains/phases, etc. In nanocoatings technology, due to the nature of the nanocoatings, different and unique properties will be created at the surface of the components.

Deposition Techniques		
Gas Phase	Solution Phase	Liquid Phase or Semi-liquid
<ul style="list-style-type: none"> <li>○ Physical Vapor Deposition</li> <li>○ Chemical Vapor Deposition</li> </ul>	<ul style="list-style-type: none"> <li>○ Sol-gel/ Dip Coating</li> <li>○ Electrochemical</li> <li>○ Chemical Solution</li> </ul>	<ul style="list-style-type: none"> <li>○ Welding</li> <li>○ Thermal Spray</li> <li>○ Laser</li> <li>○ Plasma</li> </ul>

## Classification of coatings and nanocoatings in terms of microstructure

Nanosized Part		Example	Properties
Conventional Coatings	Without nanosized part	Plating VPS -HVOF	Improving functional properties relative to the base piece
Nanostructure Coatings	Nanosized structure	Nano Plating PVD, EB-PVD, ESD, PACVD	Increasing corrosion resistance Improving thermal stability Enhancing wear properties
Nanocomposite Coatings	Dispersion of nanoparticles	Nano Plating Nano-HVOF, PVD, PACVD	Increasing surface hardness Enhancing wear properties

Nanosized Part		Example	Properties
Nanolayer Coatings	Nanometer thickness	PVD, PACVD	Increasing fracture toughness Decreasing friction coefficient Improving wear properties
Nanolayer Coatings	One of the above-mentioned + A nitriding layer	Plasma nitriding + PACVD or PVD	Improving mechanical performance Increasing coating adhesion

### Applications of nanocoatings technology in different industries

Industrial Field	Applications and Advantages
Oil and energy	The severe corrosion and wear in the operational environments of the oil and energy industries, damages the surface of the components and equipment. Nanocoatings extend the life of these components, and reduce the duration of interruptions in different operations.
Construction and Building	Nanocoatings because of the variety of colors, properties, easy deposition, surface appearance, no absorption of stains, etc., are widely used in construction and building.
Automobile Manufacturing	Nanocoatings are used in automotive components, as well as tools and moulds. Increasing engine performance and efficiency, improving internal and external appearance, reducing fuel consumption, biocompatibility, etc., are of the benefits of using this technology.
Agriculture and Food	In the maintenance and repair of equipment such as motors, gears and bearings of machines, as well as cutting blades of combines, use of the nanocoating technology creates the resistance against wear, corrosion and impact.
Production and Manufacturing	The maintenance and repair of the tools and moulds in various industries against the wear and corrosion are of the paramount importance. Nanocoating technology improves the lifespan and quality of the moulds and tools, as well as enhances the quality of the manufactured products.
Polymer and Plastic	Nanocoatings can improve the properties and quality of the devices such as extruders, plastic injection moulds, blow moulds and various blades which are used for production of plastic and polymer products.
Aerospace	With this technology, the reliability and lifespan of the equipment and components will increase. Applying these types of coatings increases the high-temperature resistance, corrosion resistance and wear properties of the engine components and other equipment.
Textile	The different parts of spinning machines such as straps, wheels, needles, or other equipment such as dyeing machines, etc., are susceptible to the various damages. With the aid of nanocoating technology these problems can be obviated.
Medical and Pharmaceutical	Medical tools, implants, pharmaceutical industry equipment, processing and packaging, and some of the precise electronic and mechanical components are coated for improving their hardness, chemical inertness, biocompatibility and antibacterial effect.



# Hybrid PVD System



## Introduction

Hybrid PVD system operates based on both cathodic arc and sputtering processes. In cathodic arc deposition, an electric arc is used to vaporize material from a target, while in sputtering atoms are ejected from a target as a result of the bombardment of the target by high energy particles. Then the vaporized/ejected material condenses on a substrate, forming a thin film. Hybrid PVD is widely used to synthesize extremely hard films to protect the surface of cutting tools and extend their life remarkably.



## Application

Deposition of hard thin films, super hard coatings and nanocomposite coatings, including TiN, TiAlN, CrN, ZrN, AlCrTiN and TiAlSiN.



## Certificates and standards

- Certificate of Nanotechnology

**Technical specifications**

Source	Arc-PVD (Hybrid Deposition Capability by using Magnetron Sputtering and Evaporation)
No. of Rotating Cathode	8 Cathodes (Substitution with DC Magnetron Sputtering in Arc-PVD Mode)
Thermal Evaporation Source	One Liner Thermal Evaporation Source with 16 Tungsten Crucibles
Chamber Dimensions (D×H) mm	1200×1000
Bias Voltage	DC (Optional: Pulsed)
Plasma Zone Dimensions (D×H) cm	90×70 cm
Substrate Maximum Weight (kg)	400

**About Company**

Name of company	Sevin Plasma Surface Engineering
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**Nanotechnology in Product**

A wide variety of hard thin films, super hard nanostructured coatings and nanocomposite coatings can be synthesized by Hybrid PVD system.



## Wear & Erosion-resistant Super-hard Nanolayer & Nanocomposite Coatings on the Various Types of Cutting Tools

### Introduction



Nanolayer and nanocomposite coatings such as TiN, TiAlN, TiCN, TiSiN are deposited on a variety of cutting tools such as drill, reamer, finger milling, grinding tools, etc., for extending their life span (about 3 to 5 times), improving their performance and enhancing the quality of the manufactured components. It is worth mentioning that the deposition of above-mentioned coatings is performed by using a Hybrid PVD system which operates based on both cathodic arc and sputtering processes.

### Application



- Improving the wear and erosion properties of different types of cutting tools

**Certificates and standards**

- Certificate of Nanotechnology

**About Company**

Name of company	Sevin Plasma Surface Engineering
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## **Wear-, Erosion- & Corrosion-resistant Super-hard Nanolayer & Nanocomposite Coatings on the Surface of Different Metal Forming Moulds**

### **Introduction**



Extremely hard nanolayer and nanocomposite coatings, resistant to wear, erosion, as well as corrosion, are deposited onto the surface of a variety of forming tools such as die and punch, deep drawing, cold and hot forging, extrusion, die casting, and injection molding tools to improve the surface quality of the moulds, extend their life span up to 10 times, and enhance their performance remarkably. It is worth mentioning that the deposition of above-mentioned coatings is performed by using a Hybrid PVD system which operates based on both cathodic arc and sputtering processes.

### **Application**



- Improving the wear, erosion and corrosion properties of metal forming moulds

**Certificates and standards**

- Certificate of Nanotechnology

**About Company**

Name of company	Sevin Plasma Surface Engineering
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# **Wear- & Corrosion-resistant Super-hard Nanolayer & Nanocomposite Coatings on the Surface of the Turbine Blades at the Low Temperature Parts**



## **Introduction**

Wear- and corrosion-resistant super-hard nanolayer and nanocomposite coatings are widely applied onto the surface of the turbine and compressor blades in the oil, gas and aerospace industries as an alternative for the conventional coatings. It is worth mentioning that the deposition of above-mentioned coatings is performed by using a Hybrid PVD system which operates based on both cathodic arc and sputtering processes.



## **Application**

- Generally, nanostructured coatings and nanocomposite coatings improve the hardness, wear, and corrosion properties of turbine and compressor blades.

**Certificates and standards**

- Certificate of Nanotechnology

**About Company**

Name of company	Sevin Plasma Surface Engineering
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# Cathodic Arc Deposition System



## Introduction

Cathodic Arc Deposition system is a widely used industrial-scale machine for applying high quality thin film coatings. The Arc-PVD process is based on low-voltage, high current cathodic arc physics that produce dense and highly ionized plasma. In this process an electric arc is used to vaporize material from a cathode target. Then the vaporized material condenses on a substrate, forming a thin film. The technique can be used to deposit metallic, ceramic, and composite films.



## Application

- Deposition of extremely hard film to protect the surface of cutting tools and extend their life significantly.
- Production of diamond-like amorphous carbon films by deposition of carbon ion.



## Certificates and standards

- Certificate of Nanotechnology

**Technical specifications**

Device Models	Arc-PVD 1600	Arc-PVD 2300
No. of Arc-cathodes	20 Arc-cathodes with 3-inch Diameter Target	39 Arc-cathodes with 3-inch Diameter Target
Chamber Dimensions (D×H)	1600×1800 mm	2300×1800 mm
Base Vacuum (Torr)		10 <sup>-5</sup>
Substrate Bias Voltage	Pulse Bias Voltage	
Mass Flow Controller (MFC)	3 Separated MFCs	
Heating System	Ability of Increasing Temperature up to 200 °C	
User Interface	Controlling System with Full Color Touchscreen	
Other Features	<ul style="list-style-type: none"> <li>• Rotating Sample Holder with Adjustable Speed</li> <li>• Equipped with Plasma Cleaner</li> </ul>	

**About Company**

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**Nanotechnology in Product**

A wide variety of super hard coatings, nanocomposite coatings and multilayer thin films can be synthesized by Arc-PVD device.



# Cathodic Arc & Sputtering System



## Introduction

Cathodic Arc Deposition system is a widely used industrial-scale machine for applying high quality thin film coatings. In cathodic arc process, an electric arc is used to vaporize material from a cathode target. Then the vaporized material condenses on a substrate, forming a thin film. The technique can be used to deposit metallic, ceramic, and composite films.



## Application

- Deposition of extremely hard film, including TiN, TiAlN, CrN, ZrN, ZrN, and AlCrTiN to protect the surface of cutting tools and extend their life significantly.
- Production of diamond-like amorphous carbon films by deposition of carbon ion.



## Certificates and standards

- Certificate of Nanotechnology

## Technical specifications

Device Model	DE600
Source	Arc-PVD
Base Vacuum (Torr)	$10^{-5}$
Controlling System	HMI + PLC
Vacuum Pump	Rotary Pump and Diffusion Pump DP320
Pressure Gauge	<ul style="list-style-type: none"> <li>• 2 Pirani Gauges</li> <li>• Cold Cathode Pressure Gauge</li> </ul>
Discharge Valve	2 Independent Discharge Valves
Inlet and Outlet Valves	Aeration, Electrical Gas, Direct, Backing and High Vacuum Valves
Chamber	Cylindrical Shape Made of Stainless Steel
Chamber Diameter (mm)	600
Power Supply	<ul style="list-style-type: none"> <li>• Arc Cathode Power Supply, 200 A (6 series)</li> <li>• Substrate Bias Power Supply</li> </ul>
Shutter	1 Unit
MFC	2 Units
Other Features	<ul style="list-style-type: none"> <li>• Rotating Sample Holder</li> <li>• 3-inch Diameter Cathodes (6 Units)</li> <li>• Plasma Cleaner System</li> <li>• Water-cooled Chamber</li> </ul>

## About Company

Name of company	Yar Nikan Saleh Co.
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## Nanotechnology in Product

A wide variety of super hard coatings, nanocomposite coatings and multilayer thin films can be synthesized by Cathodic Arc & Sputtering System.



## Golfa Nanocoating-Decorative Corrosion- & Scratch-resistant Nanostructured Coatings

### Introduction

Faucets and taps contain internal and external sections. The internal sections are usually made of brass and ferrous alloys. Corrosion and abrasion resistance and beautiful appearance for external sections have achieved by applying a variety of coatings. Hard coatings are the common types which have been widely used because of their wear resistance and beautiful colors. Appropriate coatings with proper deposition processes are chosen due to the material of faucets. Nitrides containing simple metal such as TiN, ZrN and CrN are the first generation of PVD hard coatings which have been used for decorative purposes due to their beautiful appearance. Among common methods for deposition of these coatings, different PVD methods (Arc-PVD and sputtering) have become more attractive due to some special properties which can be obtained by them, such as getting nanostructured coating, high speed of production and good coating quality.



### Application

- Decorative coatings are applied to buildings and associated structures for decoration and protection



### Advantage of Using Nanotechnology

The corrosion, wear and erosion properties can be improved by deposition of nanostructured coatings.



### Certificates and standards

- Certificate of Nanotechnology

## About Company

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Email	golfapvd@gmail.com



# Zirconium-based Nanoceramic Conversion Coating

## Introduction



Zirconium-based conversion coating, as a suitable alternative for common phosphate and chromate coatings, are widely applied on metallic surfaces to promote the paint adhesion and improve the corrosion performance. These coatings are based on the eco-friendly compounds; furthermore, the main advantage of these coatings is no need for thermal energy which consequently leads to cost reduction.

## Application



- Improving the paint adhesion and the corrosion performance of metallic surfaces



## Certificates and standards

- Certificate of Nanotechnology

## About Company

Name of company	SCHILLER
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## Nanotechnology in Product

The nanoceramic-based conversion coatings allows the production of thin nanometer range coatings, based on the combination of a nano-structured ceramic-type metallic oxide, with a metals like titanium and zirconium. These types of coatings promote the paint adhesion and improve the corrosion performance of metallic surfaces.



# Plasma Technology

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- Plasma Technology Introduction
- PlasmaTex (Textile Plasma Processing Unit)
- Plasma DEJ (Textile Plasma Processing Unit)
- Plasma Cleaner System
- Cold Plasma for Food Processing
- Super Arc Plasma Unit
- Plasma Sterilizer Unit
- Corona Print Unit
- Corona Treatment Unit
- Plasma Glide
- Plasma Jet

# Plasma Technology

Plasma can be defined as a gas which is fully or partially ionized. More precisely, plasma is a gaseous medium consisting of molecules, atoms, ions, and electrons. Due to the presence of charged particles, plasma has an electrical conductivity, therefore it may be strongly influenced by electric and magnetic fields.

Plasma, in broadest meaning, describes any gas which only 1% (or less) of its atoms are ionized. The density of plasma, however, specifies the nature of gas in much narrower and more extreme terms. The density of plasma determines the degree of ionization.

According to this definition, low density plasmas (e.g. ionization of only 1% of atoms) are typically called cold plasma.

As mentioned earlier, plasma has electrically charged gaseous particles (gaseous ions), and because of that, its particles may be accelerated under electrical and/or magnetic fields. Because of these features, the use of plasma (in broadest meaning, from cold plasma to high temperature/density plasma) has become commonplace in industrial and laboratory equipment.

Since plasma has high energy particles and its particles can be accelerated in the presence of electric/magnetic fields and hit the surfaces, it can be used in textiles surface modification, etching and cleaning, polymerization, deposition and production of nano-structures. The collision of high-energy particles and their reaction with the surface of materials break the chains and lead to the formation of free radicals, while the properties of bulk materials remain constant.

Generally, the surface modifications by plasma can create or improve characteristics such as hydrophilicity, antistatic properties, chemical absorption, dye absorption, printability, increasing the effective surface, creating active sites, adhesion and many other cases in produced textiles.





# PlasmaTex (Textile Plasma Processing Unit)



## Introduction

Textile Plasma Processing Unit (PlasmaTex) is a roll to roll textile processing machine which aims at providing finished fabrics with many features appreciated by the industry, including anti-shrinking, anti-pilling, anti-static effect, sterilization, improvement of wetting and dyeing, and optimization of fabrics desizing. Since most textile materials are heat sensitive polymers, this surface treatment machine works based on atmospheric pressure plasma, in which fabric is driven by a roll system, to pass among a set of rods that are electrodes generating plasma.



## Application

- Improving hydrophilicity, desizing and adhesion promotion.
- Introducing innovative properties to the finished fabrics such as anti-shrinking, anti-pilling, etc.
- Surface activating and functionalization of textiles.



## Certificates and standards

- Certificate of Nanotechnology

**Technical specifications**

Device Models	Plasma-Tex 1080	Plasma-Tex 2080	PlasmaTex 20160	PlasmaTex 30220	PlasmaTex 40160	PlasmaTex 60220
Power (kW)	10	20	20	30	40	60
Roller Width (mm)	800	800	1600	2200	1600	2200
Electrode Diameter (mm)				6		
Maximum Inter-electrode Gap (mm)				2		
Production Rate (m/min)				5-70		
Plasma Temperature (°C)				300		
Frequency (kHz)				18 to 25		
Material Thickness (mm)				1.5		
Processing Materials				Woven, Knitting and Non-woven Fabrics		
Dimensions (cm)				390×125×198		
Weight (kg)				2500		

**About Company**

Name of company	Advanced Equipment Engineering Co.
Website	<a href="http://www.adeeco.ir">www.adeeco.ir</a>
Email	info@adeeco.ir

**Nanotechnology in Product**

PlasmaTex Unit is a suitable tool to produce functionalized nano layers on textiles and polymers which provide surfaces with different properties such as wettability, adhesion promotion, and ability to repel water or other liquids, etc.



# PlasmaDEJ (Textile Plasma Processing Unit)

## Introduction



Textile Plasma Processing Unit is a plasma-based material processing tool which aims at providing surfaces with hydrophobic and dirt-repellent characteristics. This processing unit works based on cold plasma because most textile materials are heat sensitive polymers. In this low pressure plasma system, plasma is generated in an evacuated chamber containing small amounts of the desired precursor gas. Plasma (ionized gas containing both charged and neutral species, including free electrons, positive and/or negative ions, atoms, and molecules) comes into contact with the material surface and allows subsequent reactions to take place on the material surface.

## Application



- To coat textiles and polymers with a specialized layer with varying characteristics such as the ability to repel water or other liquids.
- To pre-treat fibers to increase wettability.
- Surface activating and functionalization of textiles.

## Certificates and standards



- Certificate of Nanotechnology

**Technical specifications**

Device Model	VPT03BF
Chamber	Material: Steel Diameter: 410 mm Capacity: 65 L
Power Supply	220 V, 50 Hz
Power (W)	300
Vacuum Pump	Two-stage Rotary Vane Pump
Vacuum Gauge	Pirani Gauge
Working Temperature (°C)	Up to 60
Dimensions (cm)	60×110×190
Weight (kg)	400

**About Company**

Name of company	Basa Fanavarane Nasir
Website	<a href="http://www.basafan.com">www.basafan.com</a>
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**Nanotechnology in Product**

Textile Plasma Processing Unit is a suitable tool to produce functionalized nano layers on textiles and polymers which provide surfaces with different properties such as wettability, adhesion promotion, and ability to repel water or other liquids, etc.



# Plasma Cleaner System



## Introduction

Plasma Cleaner is one of the most widely used plasma systems for removing contaminants from the surface of treated substrates without affecting the bulk material properties. In this system, all organic matters are removed from the surface of an object through the use of an ionized gas called plasma which is generally generated in a vacuum chamber by utilizing oxygen, argon or other gases. The cleaning process works for a large range of materials including metals, plastics, glass, ceramics, etc. Furthermore, it is an environmentally safe process because eliminates the need for hazardous chemical solvents.



## Application

- Surface cleaning of polymers, metals and textiles.
- Sterilization of medical equipment.
- Surface cleaning and activation of automobile components.
- Increasing surface energy and hydrophilicity.



## Certificates and standards

- Certificate of Nanotechnology

## Technical specifications

Working Voltage (V)	220
Power (W)	Up to 200
Chamber Capacity (L)	3
Chamber Material	Quartz
Processing Gas	30 Different Types
Gas Flow Rate (ml/min)	Up to 500 (with 0.1 ml/min accuracy)
Other Features	Touch Screen Display RF power supply Vacuum gauge in mTorr range

## About Company

Name of company	Danesh Pooyan Satia
Website	<a href="http://www.satiaco.com">www.satiaco.com</a>
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## Nanotechnology in Product

Plasma Cleaner is capable of changing a variety of surface features by producing nano-scale layers on the substrate surface through using different gaseous species such as oxygen, argon, nitrogen, hydrogen, helium, etc.



# Cold Plasma for Food Processing

## Introduction



Cold Plasma for Food Processing works based on a novel non-thermal food processing technology that uses energetic and reactive gases for mild surface decontamination of foods and packaging materials. In this system, dielectric barrier discharge (DBD) is used as a common method for generation of non-thermal plasma. DBD is electrical discharge between two electrodes which at least one of them is covered by an insulating dielectric barrier. Applying high voltage alternating current leads to the non-thermal DBD plasma generation at atmospheric pressure.

## Application



- To disinfect the surfaces of packaging or food products.
- Plasma surface processing.
- Seed germination in agriculture.
- Improving surface wettability.



## Certificates and standards

- Certificate of Nanotechnology

## Technical specifications

Device Model	Enhancedtech™-16I
Power Supply	Single-phase, 220 V AC, 50 Hz
Plasma Output Power (W)	Variable Voltage 0-25 kV, 50 kHz Variable Voltage 0-10 kV, 6-20 kHz
Chamber Diameter (cm)	22
Electrodes Distance (cm)	Adjustable 0.5 to 3
Side Probe	Cold Plasma Jet, Dielectric Barrier Discharge (DBD)
Processing Materials	Non-conductive materials
Processing Gas	Air
Processing Time	Adjustable
Dimensions (L×W×H) cm	70×45×60
Weight (kg)	50

## About Company

Name of company	Kavosh Yaran Fann-e Pouya
Website	<a href="http://www.ad-kavoshyaran.ir">www.ad-kavoshyaran.ir</a>
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## Nanotechnology in Product

Cold Plasma for Food Processing is capable of changing a variety of surface features by producing nano-scale layers on the substrate surface. For instance, nanocoating can create new barrier properties for food packages.



# Super Arc Plasma Unit



## Introduction

Super Arc Plasma Unit is an atmospheric pressure plasma processing tool which provides a plasma with a relatively high density, high electron temperature and various types of species, i.e. electrons, ions, excited atoms and molecules, and reactive species. In this process, generated plasma comes into contact with the material surface and allows subsequent reactions to take place on the material surface. Some key features of this system such as low temperature, low cost, and flexibility make it suitable for a variety of applications including surface processing, decontamination, etc.



## Application

- Surface cleaning and adhesion promotion.
- Improve printing, color absorption, hydrophilicity, etc.
- Disinfection of surfaces of packaging or food products.



## Certificates and standards

- Certificate of Nanotechnology

**Technical specifications**

Device Models	Plasmatech™-15A	Plasmatech™-15B
Device Mobility Condition	Fixed	Portable
Power Supply	Single-phase, 220 V AC, 50 Hz	Single-phase, 220 V AC, 50 Hz
Plasma Output Power (W)	450	2800
Surface Processing Area (cm <sup>2</sup> )	Automatic Scan up to 2800	Variable
Probe Type	Automatic	Manual
Probe Dimensions (L×W×H) cm	20×10×7	8.5×7×3.5
Plasma Flame (Length×Width) mm	35×35	110×40
Processing Rate (m/min)	0 to 36	Manual Adjustment
Software	Laser cut ,CorelDraw 3 &4	-
Processing Materials	Non-conductive materials	Non-conductive materials
Dimensions (L×W×H) cm	140×110×114	65×45×55
Weight (kg)	220	70

**About Company**

Name of company	Kavosh Yaran Fann-e Pouya
Website	<a href="http://www.ad-kavoshyaran.com">www.ad-kavoshyaran.com</a>
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**Nanotechnology in Product**

Super Arc Plasma is capable of changing a variety of surface features by producing nano-scale layers on the substrate surface through using different gaseous species such as oxygen, argon, etc. For instance, nanocoating helps to create new barrier properties for food packages.



# Plasma Sterilizer Unit



## Introduction

Plasma Sterilizer Unit is a low temperature sterilization tool which widely used in case of medical and scientific equipment which cannot be successfully sterilized in an autoclave. In this system, hydrogen peroxide plasma is used to sterilize. When an aqueous solution of hydrogen peroxide is dosed into the vacuum chamber it evaporates and disperses. Due to the disinfecting properties of hydrogen peroxide, it kills all bacteria in the chamber and on the surface; thus completing one phase of the sterilization process. Once the pressure inside the chamber drops more and the particles become excited enough to ionize, the hydrogen peroxide gas turns into plasma. During this part of the sterilization, the plasma breaks down all of the genetic material of any bacteria into smaller molecules, eradicating them and any harmful by-products.



## Application

- Non-hollow loads, such as electrocautery instruments, dopplers, laser probes, defibrillator paddles, thermometers, Ophthalmic lenses, and harmonic cables
- Hollow loads, such as Laryngoscopes and their blades, shaver handpieces, fiber optic light cables, and surgical power drills
- Endoscopes, such as rigid and flexible endoscopes.



## Certificates and standards

- Certificate of Nanotechnology

## Technical specifications

Device Models	PSP-PL-130	PSP-PL-130D
Door Option	Single Door	Double Door
Dimensions (mm)	1120×1547×778	1060×1750×1040
Weight (kg)	440	640
Power Supply	Single-phase, 230 V, 50-60 Hz	
Chamber Volume (L)	130	
Chamber Material	Stainless Steel	
Sterilization Temperature (°C)	Less than 60	
Cycle Time (min)	Without Lumen: 28 Economic: 45 Advanced: 62	
Control System	8.4 inch Multi-color Touch Screen Panel Thermal Printer	

## About Company

Name of company	Pars Sinuhe Pad
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Email	<a href="mailto:info@psptrade.com">info@psptrade.com</a>

## Nanotechnology in Product

Plasma Sterilizer is a novel tool for sterilizing heat and moisture-sensitive equipment, especially in medicine. Application of some of the nanotechnologies in biology and medicine requires full sterilization on nanoscales relevant for the nanostructures that are being implemented.



# Corona Print Unit



## Introduction

Corona Print Unit is a surface processing tool to increase the surface energy of plastic films, foils and paper to improve wettability and adhesion of inks, coatings and adhesives. Corona is a visible electrical discharge which occurs when a high voltage, high-frequency electrical potential is applied to a small diameter electrode in relatively close proximity to an electrical ground. The resulting electrical discharge is known as a Corona Discharge. This corona discharge will cause partial ionization of the surrounding atmosphere and can be used for surface modification.



## Application

- Pre-treatment before printing, adhesion, coating.



## Certificates and standards

- Certificate of Nanotechnology

### Technical specifications

Power Consumption (kW)	Up to 30
Treating Width (mm)	400-3000
Line Speed (m/min)	Up to 200
Electrode Material	Ceramic
Dimensions (cm)	60×30×50

### About Company

Name of company	Plasma Fanavar Jam Engineering Co.
Website	<a href="http://www.jam-plasmatech.com">www.jam-plasmatech.com</a>
Email	<a href="mailto:info@jam-plasmatech.com">info@jam-plasmatech.com</a>

### Nanotechnology in Product

Corona Print Unit is capable of increasing wettability and adhesion of inks, coatings and adhesives by producing nano-scale features on the substrate surface



# Corona Treatment Unit



## Introduction

Corona Treatment Unit is a surface processing tool to increase the surface energy of plastic films, foils and paper to improve wettability and adhesion of inks, coatings and adhesives. Corona is a visible electrical discharge which occurs when a high voltage, high frequency electrical potential is applied to a small diameter electrode in relatively close proximity to an electrical ground. The resulting electrical discharge is known as a Corona Discharge. This corona discharge will cause partial ionization of the surrounding atmosphere and can be used for surface modification.



## Application

- Pre-treatment before printing, adhesion, coating.
- Oil film removal from metallic foils.
- Anti-fog treatment of plastic boards.



## Certificates and standards

- Certificate of Nanotechnology

**Technical specifications**

Treating Width (mm)	350-860
Line Speed (m/min)	Up to 400
Treating Side	One (two side optional)
Electrode Material	Ceramic
No. of Electrodes	2 to 6
Base Roller Material	Aluminum
Base Roller Diameter (mm)	100
Control Panel	Touch Screen
Other Features	Equipped with ozone ventilation system to exhaust ozone and nitrogen oxide (NOx)

**About Company**

Name of company	Plasma Ide Azma Engineering Co.
Email	parsautomation@yahoo.com

**Nanotechnology in Product**

Corona Treatment Unit is capable of increasing wettability and adhesion of inks, coatings and adhesives by producing nano-scale features on the substrate surface.



# Plasma Glide



## Introduction

Plasma Glide is a surface treatment tool which works based on cold atmospheric plasma. Several different gases can be used to produce cold atmospheric plasma such as Helium, Argon, Nitrogen, and air. There are many methods of production by which cold atmospheric plasma is created. In this system, plasma is generated between two crescent electrodes. The high electron density at low temperature makes this system an appropriate tool for processing a wide variety of materials without the risk of thermal damage. Therefore, this device can be used for surface processing of textiles, surface activation, cleaning and etching, polymerization, etc.



## Application

- Enhancement of hydrophilicity, dyeing and adhesion promotion.
- Surface modification of fibers and polymers to introduce novel properties to the surface by changing the composition or structure.



## Certificates and standards

- Certificate of Nanotechnology

## Technical specifications

Power Supply	220 V, 380 Hz
Output Voltage (kV)	10-30
Power (kW)	3 to 5
Process Gas	Atmosphere
Plasma Processing Time	Continuous Operation
Control Panel	PLC
Dimensions	Variable (depends on device power)
Weight	Variable (depends on device power)
Processing Speed (m/ min)	Up to 30

## About Company

Name of company	Plasma Ide Azma Engineering Co.
Email	parsautomation@yahoo.com

## Nanotechnology in Product

Plasma Glide is capable of introducing novel surface properties to a wide range of materials by producing nano-scale features on the substrate surface.



# Plasma Jet



## Introduction

Plasma Jet is a surface treatment tool which works based on cold atmospheric plasma. Such plasmas are not under thermal equilibrium; typical ion temperatures are about 300-400 K while electron temperatures are much higher. This feature enables the users to treat sensitive surfaces without the risk of thermal damage. This device is equipped with a low area, rotating torch which is able to enhance surface properties, especially dyeing and stability of pigments on the surface.



## Application

- Enhancement of hydrophilicity, dyeing and adhesion promotion.
- Surface modification of fibers and polymers to introduce novel properties to the surface by changing the composition or structure.



## Certificates and standards

- Certificate of Nanotechnology

**Technical specifications**

Power Supply	220 V, 380 Hz
Output Voltage (kV)	10-30
Power (kW)	1 to 3
Process Gas	Atmosphere
Plasma Processing Time	Continuous Operation
Control Panel	PLC
Dimensions	Variable (depends on device power)
Weight	Variable (depends on device power)
Processing Speed (m/ min)	Up to 80
Other Features	Equipped with compressed air inlet

**About Company**

Name of company	Plasma Ide Azma Engineering Co.
Email	parsautomation@yahoo.com

**Nanotechnology in Product**

Rotary Jet Plasma is capable of introducing novel surface properties to a wide range of materials by producing nano-scale features on the substrate surface.





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