INIC

Iran Nanotechnology Equipment

February 2019

Iran Nanotechnology Equipment

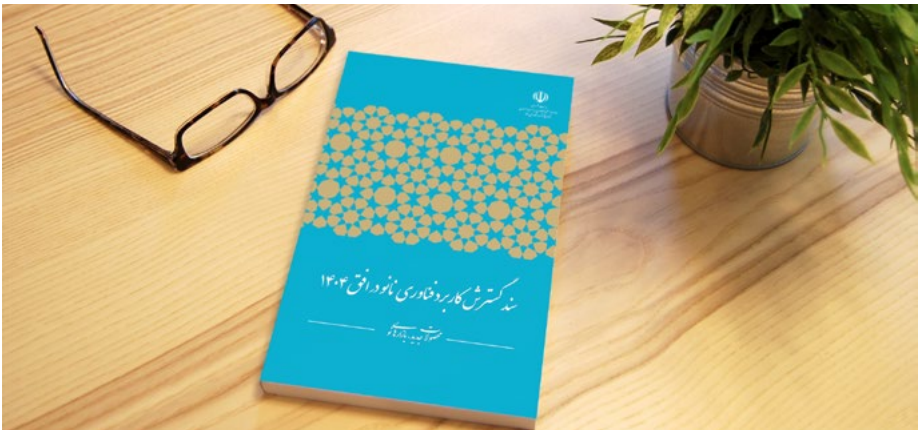
Contents

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.

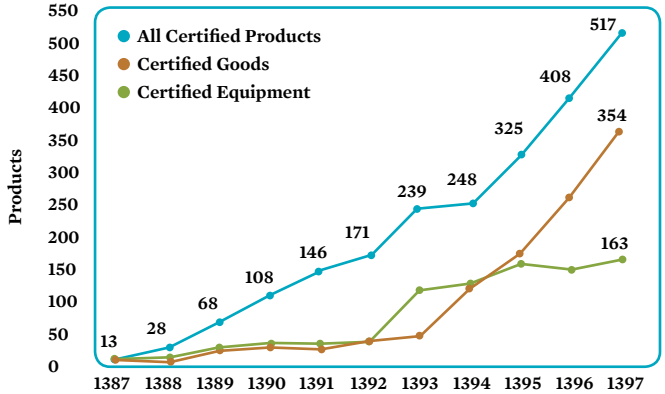
Product Acceptance Criteria

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.

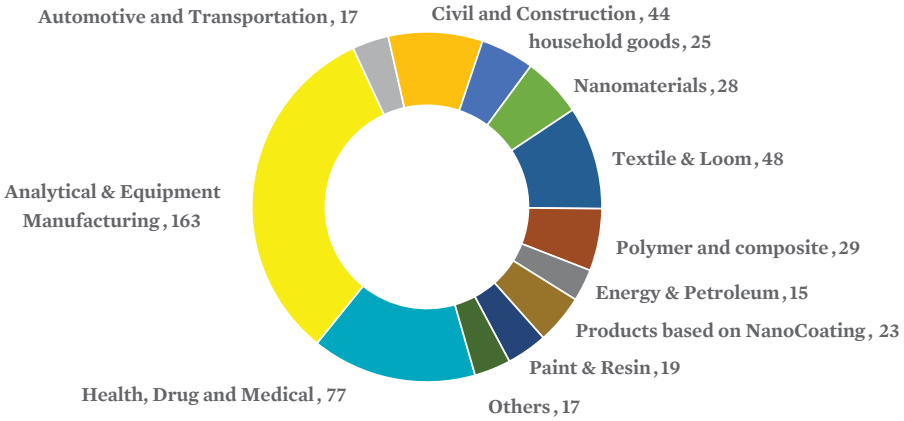
It is worth mentioning that the products that comply with the International Standard of ISO/TS 18110:2015 and National Standard of ISIRI 12098 are issued with the Nanoscale Certificate after being evaluated and characterized by the related analyses. This one-year certificate, able to be extended for 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)

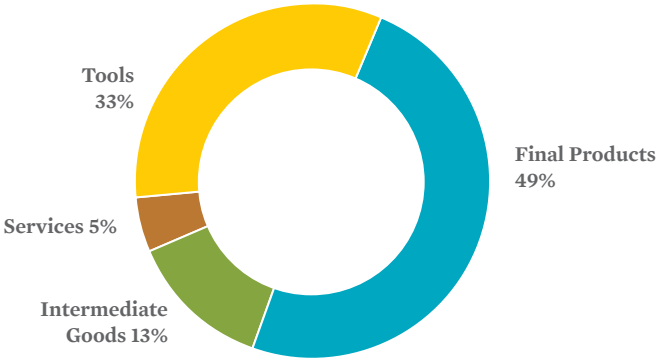


The following table indicates statistics for the nanotechnology products of Iran, which have received the Nanoscale Certificate until January 2019.

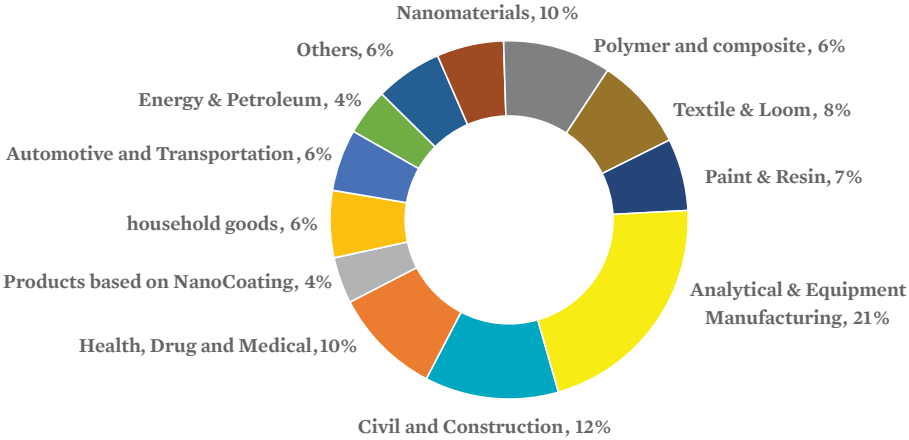
Companies		Products	
157	Goods Manufacturer	354	Certified Goods
46	Equipment Manufacturer Total	163	Certified Equipment
203	Total	517	Total



The Classification of the Products Holding the Nanoscale Certificate



The Classification of the Nanoscale Products based on ISO18110

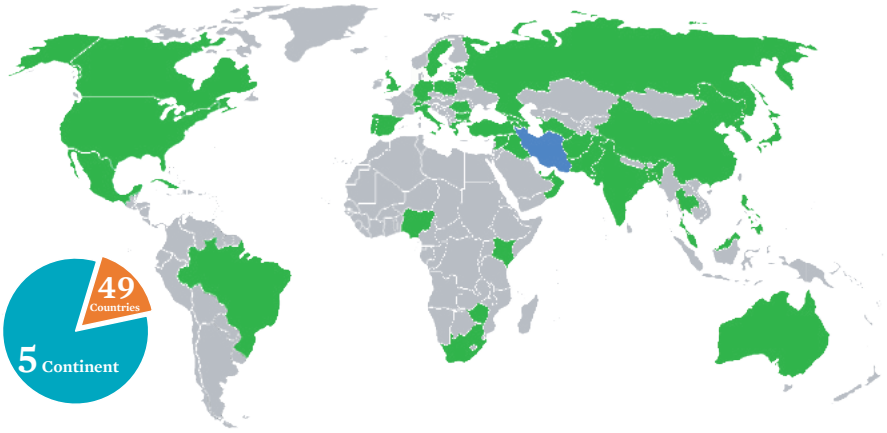


The industrial fields of companies that produce these products holding the nanoscale certificate

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 milion dollars.

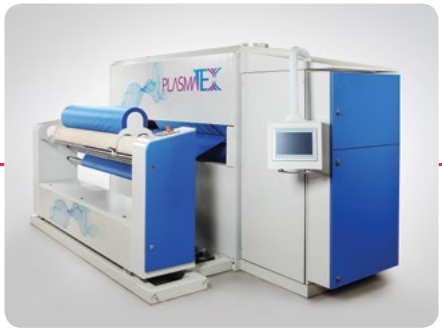
Iran Nano Export Map



Manufacturing Equipment

- Nanofiber Production Equipment
- Physical Vapor Deposition Tools
- Chemical Vapor Deposition Tools
- Solution Deposition Tools
- Plasma Surface Processing Equipment
- Homogenizing Equipment
- Grinding and Mechanical Alloying
- Bulk Nanostructured Production Equipment
- Lithography and Etching Systems
- Other Equipment


Plasma Jet


PLASMTEX

Manufacturing Equipment

Nanofiber Production Equipment

- 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

Fanavaran Nano Meghyas

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	Fanavaran Nano Meghyas
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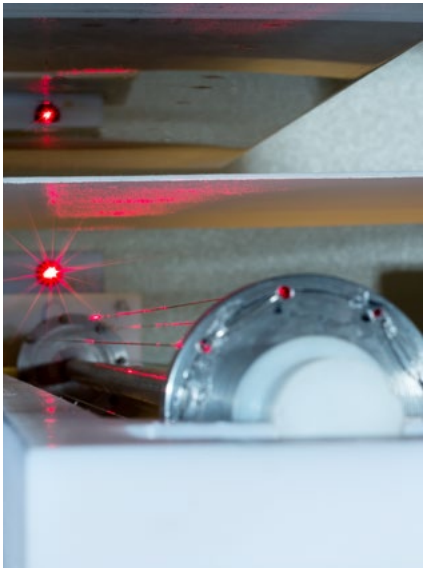
Nanotechnology in Product

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	• Single-phase, 220 V AC, 50-60 Hz • Three-phase, 380 V AC, 50-60 Hz (customer order)		
High Voltage Power Supply	• 50 kV DC, Positive/ Negative Polarity • Digital Display of Voltage with a Precision of 0.1 kV • 50 kV DC, Positive/ Negative Polarity • Digital Display of Voltage with a Precision of 0.1 kV		
Spinneret (needleless e-spinning)	• Material: steel • Diameter: 6 cm • Length: 30-160 cm (based on order) • Rotation Speed: 1-20 rpm		
Nozzle (needle-type e-spinning)	• Material: steel • No. of Nozzles: 10 to 50 in each unit • Length: 30-160 cm (based on order) • Number: 20 to 100 in each unit • Min. Injection Rate: 100 L/h • Max. Injection Rate: 20 mL/h		
Collector	• Material: steel • Dimension: Depending on the spinneret dimension • Working distance: 5-20 cm		
Heating system	Ambient to 40 °C		
Control Panel	• PLC with HMI Interface • Emergency Stop Button		

Technical specifications

Ventilation System	Removing solvent from chamber using a ventilation fan with scheduled operation time
Winding System	• Winding Speed: up to 1000 m/h • Max. Substrate Width: 1 m
Chamber	Metallic chamber equipped with 6 doors on side walls for easily monitoring the process
Nanofiber Diameter	60 to 500 nm
Dimensions	• L: 4 to 8 m (based on order and number of units) • W: 1 to 2 m (based on order and units width) • H: 2 to 2.5 m (based on order)
Weight	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	• 50 kV DC, Positive/ Negative Polarity • Digital Display of Voltage with a Precision of 0.1 kV				
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)	• Material: steel • Length: 20-40 cm (based on order) • Number: 10 to 50 in each unit • Min. Injection Rate: 100 L/h • Max. Injection Rate: 20 mL/h				
Collector	• Material: Anti-acid steel • Working distance: 5-20 cm • Dimensions: Depends on the spinneret dimensions				
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	• L: 100 to 200 cm (based on order and number of units) • W: 80 to 120 cm (based on order and units width) • H: 120 to 180 cm (based on order)				
Weight	100 to 600 kg (based on order and number of e-spinning units)				

About Company

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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	• No. of attachable needle: Max. 2 needles (up to 10 needles base on order) • Configuration: Horizontal (no need for hose and fitting) • Injection Rate: 10 L/h to 100 mL/h • Injection Mode: Continuous or Confined	
Input Power	Single-phase, 220 V AC, 50-60Hz	
High Voltage Power Supply	• 0-35 kV (ES2000 Model equipped with 2 HV power supplies) • Digital Display of Voltage with a Precision of 0.1 kV	
Collector	• Material: Steel or Aluminum • Shape: Plate or Drum • Diameter: 8 cm • Working distance: 5-20 cm • Rotation speed: 200 to 3000 rpm	
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	Fanavaran Nano Meghyas
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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 nanofibers form on a collector.

Application

- Production of polymer/ceramic nanofibers in large quantities.

Certificates and standards

- Certificate of Nanotechnology

Nanotechnology in Product

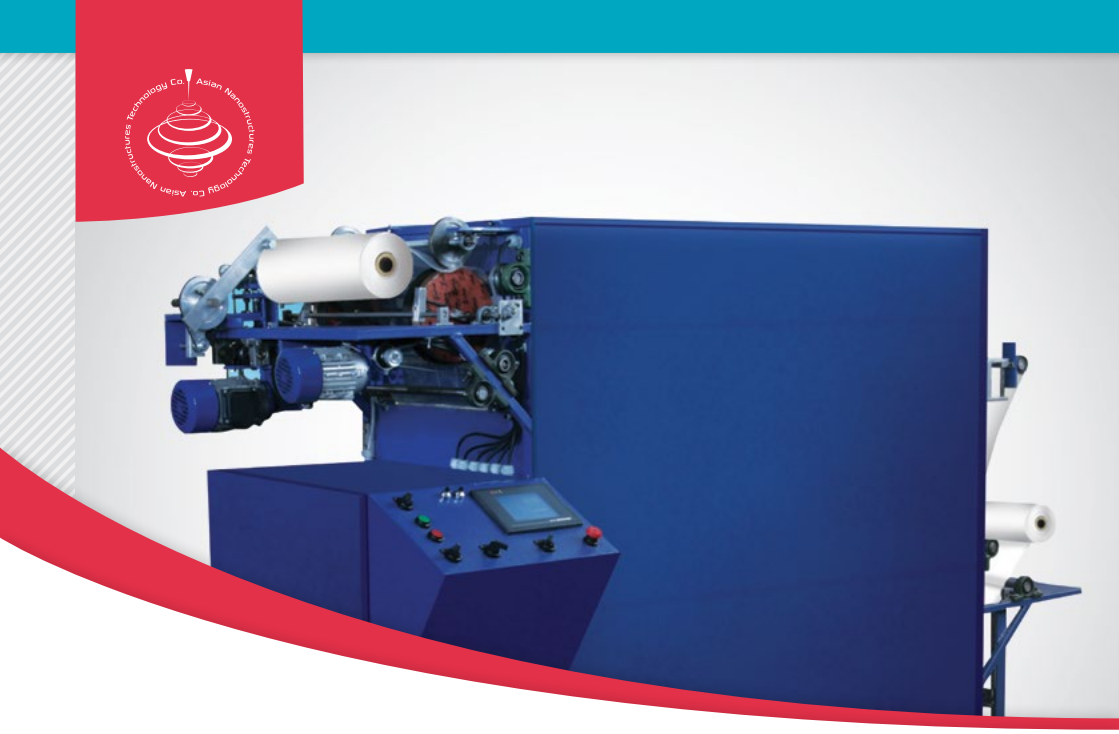
Dip electrospinning is an efficient machine for production of nanofibers in large scale quantities.

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	• Material: stainless steel • Shape: cylinder, disk and wire • Diameter: 6 cm • Rotation Speed: 2-10 rpm		
Collector	• Material: stainless steel • Shape: Flat plate or rotating drum • Working distance: 5-20 cm • Rotation speed: 10 to 50 rpm		
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		
Chamber	Metallic chamber equipped with transparent glass doors on three sides for easily monitoring the electrospinning process		

About Company

Name of company	Fanavaran Nano Meghyas
Website	www.fnm.ir
Email	info@fnm.ir



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	• Equipped with solvent recycle unit • Ventilation system for safe removing of toxic solvents and suspended nanofibers • Safety-door lock switch to prevent electric shock

About Company

Name of company	Asian Nanostructure Technology Co.
Website	www.anstco.com
Email	info@anstco.com

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
Weight (kg)	60	60	80	80	80
High Voltage Power Supply	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
No. of High Voltage Electrodes	1	1	2	2	2
No. of Independent Syringe Pumps	1	2	2	3	4
No. of Spinning Directions	1	1	2	2	2
Input Power	Single-phase, 220 V AC, 50-60 Hz				
Injection Rate (mL/h)	0.1 to 10 (with 0.1 mL/h precision)				
Collector	• Rotation Speed: 100-3000 rpm • Working Distance: 5-20 cm				
Control Panel	PLC with HMI Interface				
Dimensions (L×W×H)	60×70×100 cm				
Other Features	• Changing collector with different dimensions and even fixed collector • Adjustable scanning speed • Ability to scan on collector for uniform production				

About Company

Name of company	Fanavaran Tajhizat Nanoazma Co.
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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	• 2 Independent Syringe Pumps for Injection from 2 Perpendicular Arms • Injection Rate: 0.1 to 5 mL/h (with 0.1 mL/h precision)		
Control Panel	Touch screen panel with a designed interface software		
Dimensions (L×W×H)	95×85×180 cm		
Other Features	• Electrospinning of aligned nanofibers • Safety door lock for prevention of electric shock • Ventilation system for removing solvent from chamber		

About Company

Name of company	Atlas Saze Aria
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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.

Manufacturing Equipment

Physical Vapor Deposition Tools

- Hybrid PVD System
- Cathodic Arc Deposition System
- Cathodic Arc Deposition System
- Cathodic Arc & Sputtering System
- Pulsed Laser Deposition System
- Magnetron Sputter Coater
- Electron Beam Physical Vapor Deposition
- Multi-purpose Vacuum Coating System
- Desk Carbon Coater
- Desk Sputter Coater
- Desk Thermal Coater System
- Pulsed Laser Deposition System & Thermal Evaporator (PLD-T)
- Magnetron Sputtering System
- DC/RF Magnetron Sputtering System
- Sputter Coater
- Sputtering System

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
Website	www.sevinplasma.ir
Email	PVD.jahdi@gmail.com

Nanotechnology in Product

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

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^{-5}	
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	• Rotating Sample Holder with Adjustable Speed • Equipped with Plasma Cleaner	

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 Arc-PVD device.

KPF
VACUUM TECHNOLOGY

Cathodic Arc Deposition System

Introduction

Cathodic Arc Deposition system is a synthesis tool which operates based on physical vapor deposition (PVD) technology. In this process, an electric arc is used to vaporize material from a cathode target. The vaporized material then condenses on a substrate, forming a thin film. The thickness of the deposited layer can be adjusted by controlling the amount of condensed material. 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.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	NANOCOAT A 180
Target Dimension	4-inch Target
No. of Evaporation Sources	18
Vacuum Pump	Rotary, Roots, and Diffusion Pumps
Mass Flow Control	4 units
Chamber	Double-wall Vacuum Chamber
Chamber Dimensions (D×H) mm	1600×1800
Substrate Bias Voltage	High bias voltage for better adhesion of coating
Other Features	• Equipped with plasma cleaner • Equipped with substrate heater • Automatic control system

About Company

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Nanotechnology in Product

Arc-PVD is an efficacious tool for the synthesis of a wide variety of super hard coatings, nanocomposite coatings and multilayer thin films.

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	• 2 Pirani Gauges • Cold Cathode Pressure Gauge
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	• Arc Cathode Power Supply, 200 A (6 series) • Substrate Bias Power Supply
Shutter	1 Unit
MFC	2 Units
Other Features	• Rotating Sample Holder • 3-inch Diameter Cathodes (6 Units) • Plasma Cleaner System • Water-cooled Chamber

About Company

Name of company	Yar Nikan Saleh Co.
Website	www.ynsaleh.ir
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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.

Pulsed Laser Deposition System

Introduction

Pulsed Laser Deposition (PLD) is a relatively new physical vapour deposition technique which has nevertheless been used for deposition of a vast range of materials. In this process within an ultra-high vacuum chamber, a solid target is illuminated with short high-energy laser pulses which ablate some material via thermal or non-thermal processes. The ablated material is deposited on a substrate as a thin film of amorphous or crystalline material. The number of laser pulses is adjusted to obtain the required material thickness.

Application

- Deposition of high temperature superconducting thin films.
- Formation of complex ceramic oxides and a number of optical materials.
- Deposition of hard coatings, such as boron nitride, carbon nitride and diamond-like carbon.
- Synthesis of novel nanostructured gas sensitive layers such as V_2O_5 and SnO_2.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	TEA-CO_2 pulsed-laser, CO_2 Pulsed-laser		
Energy (J)	0.1	2	30
Maximum Power (mW)	1	20	100
Maximum Laser Frequency (Hz)	100	10	1
Profile Size (mm)	10×10	15×15	50×50
Wavelength (×m)	9-11		
Power Supply	Single-phase Electric Power, 220 V, 10 A		

About Company

Name of company	Advanced Equipment Engineering Co.
Website	www.adeeco.ir
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Nanotechnology in Product

The possibility to control the morphological and structural characteristics of the ultimate structure by precisely manipulating the experimental parameters makes PLD one of the most promising techniques for the formation of thin films and nanostructured coatings.

Magnetron Sputter Coater

Introduction

Magnetron Sputter Coater is a coating system for deposition of metals, semiconductors and dielectric materials on different substrates. The sputtering process involves ejecting material from a target onto a substrate such as a silicon wafer. An important advantage of this method is that even materials with very high melting points are easily sputtered, while evaporation of these materials in a resistance evaporator is problematic or impossible.

Application

- Formation of conductive coatings on large scale samples.
- Deposition of a thin layer of conducting material on non-conducting or poorly conducting sample for X-ray microanalysis and high resolution electron microscopy.
- Deposition of composite coatings by co-sputtering of two or three cathodes simultaneously.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	Super Sputter Coater	Lab Sputter Coater	Fast Sputter Coater
Glass Jar Chamber Dimensions (mm)	200×306	200×215	150×120
Turbomolecular Pump (L/s)	80	80	
Two-Stage Rotary Pump (L/m)	160	160	160
Rotating Stage	Optional	Optional	
Sputter Gun Position	Bottom	Bottom/ Upper	Upper
Crystal Thickness Gauge	✔	✔	
RF Power Supply	Optional	Optional	
Co-sputtering Processes	✔		
No. of 2-inch Diameter Cathode	3	1	1
Mass Flow Control	✔	Optional	
PLC Full-color Touch Screen	✔	✔	
Power Supply	DC Power Supply, 200 mA		

About Company

Name of company	Advanced Equipment Engineering Co.
Website	www.adeeco.ir
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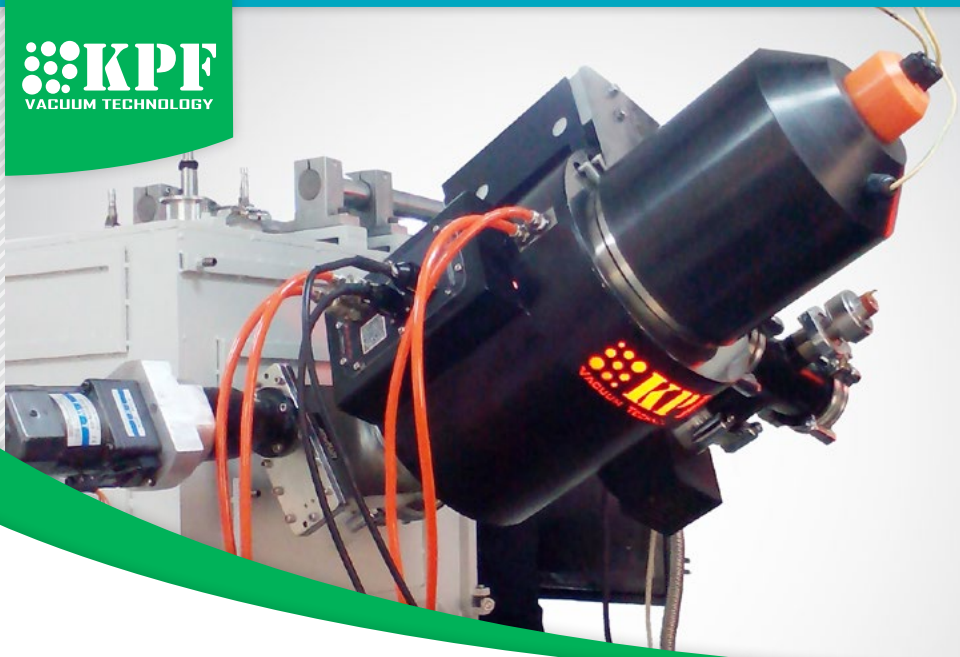
Nanotechnology in Product

Sputtering is an exceptional method for deposition of different coatings. In this process by controlling the functional parameters, thin films, and nanostructured or nanocomposite coatings can be produced. Furthermore, in the field of electron microscopy, it can be used for coating a thin layer of carbon or noble metal on the sample for high-resolution imaging and microanalysis.

KPF
VACUUM TECHNOLOGY



Electron Beam Physical Vapor Deposition

Introduction

Electron Beam Physical Vapor Deposition (EB-PVD) is a powerful physical evaporation tool that allows the user to evaporate materials that are difficult or even impossible to process, using standard resistive thermal evaporation. In this process a target is bombarded with an electron beam under high vacuum. The electron beam causes atoms from the target to transform into the gaseous phase. These atoms then precipitate into solid form, coating everything in the vacuum chamber (within line of sight) with a thin layer of the target material.

Application

- Evaporation of materials which cannot be processed using standard evaporation methods.
- Deposition of wide range of thin films of materials with high melting temperatures.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	KEB 50
Evaporation Source	Electron Beam Gun
Vacuum Pump	2-stage Rotary Pump and Turbomolecular Pump
Chamber	Double-wall, water-cooled Stainless Steel Chamber
Chamber Dimensions (mm)	700×700×7000
Control Panel	10-inch Touch Screen
Other features	• Rotation of sample holder during process • Water-cooled hearth

About Company

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Nanotechnology in Product

EB-PVD is a thermal evaporation process that allows for the direct transfer of a larger amount of energy into the source material. This permits the deposition of thin films, nanocomposite and nanostructured coatings of materials with high melting temperatures.

Multi-purpose Vacuum Coating System

Introduction

Multi-purpose Vacuum Coating System is based on Physical Vapor Deposition (PVD) technology. PVD is a vacuum coating technique vaporizing a metal to plasma of atoms or molecules and depositing them on a wide range of substrates. The two most common techniques of PVD are thermal evaporation and sputtering. Evaporation involves heating a solid material (target) that will be used to coat a substrate inside a high vacuum chamber, while sputtering is the bombardment of a target material with high energy particles that are to be deposited on a substrate like a silicon wafer. Multi-purpose Vacuum Coating System is able to utilize both methods.

Application

Deposition of wear resistant, anti-corrosive and decorative thin films.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	Labcoat 10
Source	Magnetron Sputtering
Controlling System	PLC
Base Vacuum (Torr)	5×10^{-5}
Vacuum Pump	Rotary Pump and Diffusion Pump
Vacuum Gauge	Pirani Gauge and Penning Gauge
Chamber	• Water-cooled Stainless Steel Chamber • Equipped with Door Lock Sensor
Power Supply	Pulsed DC Power Supply, 700 W
Shutter	Automatic shutter on Magnetron Sputtering Source
Other Features	• Rotating sample holder • Touch screen with data storage and recovery • Additional ports for attachment of ancillary equipment to the chamber • Ability to install substrate heating system and thickness gauge • Ability to install different evaporation sources

About Company

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Nanotechnology in Product

Physical vapor deposition (PVD) technology based on evaporation or sputtering is an exquisite method for deposition of different coatings. In this process by controlling the functional parameters, thin films, and nanostructured or nanocomposite coatings can be produced.

Desk Carbon Coater

Introduction

Desk Carbon Coater is a standard device to deposit a thin carbon layer on non-conducting or poorly conducting specimens prior to observation by a scanning electron microscope (SEM), Transmission electron microscope (TEM), or X-ray analysis (EDX). In the carbon deposition process, a carbon source–either in the form of a thread or rod is mounted in a vacuum system between two high-current electrical terminals. When the carbon source is heated to its evaporation temperature, a fine stream of carbon is deposited onto specimens.

Application

Deposition of fine-grained carbon films for SEM and TEM insulating samples.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	DCR	DCT
Vacuum Pump	Two-stage, Direct Drive, Rotary Pump	70 L/s Turbomolecular Pump & Diaphragm Backing Pump
Ultimate Vacuum (Torr)	Less than 5×10^{-2}	Less than 2×10^{-5}
Chamber	Cylindrical Pyrex chamber	
Chamber Dimensions (OD×H) mm	170 ×140	
Power Supply	Switching Pulsed DC Power Supply, 0-100 A	
Dimensions (H×W×D) cm	45×50×37 cm	
Weight (kg)	46	
Other Features	• Rotating sample holder • 7 inch touch screen control panel • Quartz crystal thickness monitor (1 nm precision) • Intuitive touch screen with colored display unit	

About Company

Name of company	Nanostructured Coatings Co.
Website	www.pvd.ir
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Nanotechnology in Product

In the field of electron microscopy and X-ray microanalysis, limited or non-conductive material samples (ceramic, polymers, etc.) require carbon coating. Creating a thin conductive layer of carbon on the sample, for instance, improves the secondary electron signal required for topographic examination in the SEM.

Desk Sputter Coater

Introduction

Sputter coater is a device for applying an ultra-thin coating or multilayer of semiconductors, dielectrics, oxidizing and non-oxidizing metals. Sputtering process involves ejecting material from a target onto a substrate. An important advantage of this method is that even materials with very high melting points are easily sputtered, while evaporation of these materials in a resistance evaporator is problematic or impossible.

Application

- Deposition of non-oxidizing metals such as gold and platinum and oxidizing metals like chromium.
- Co-sputtering of two or three cathodes simultaneously to form alloy films.
- Deposition of a thin layer of conducting material on non-conducting or poorly conducting sample prior to investigation by a scanning electron microscope (SEM).

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	DSR1	DST1	DST2-T	DST3
Sputter Source	One 2-inch cathode	one 4-inch cathode	Two 2-inch cathodes	Three 2-inch cathodes
Thermal Evaporation Source	-	✔	✔	✔
Rotary Vacuum Pump	2-stage Direct Drive	-	-	-
Turbomolecular Vacuum Pump	-	60 L/s	300 L/s	300 L/s
Diaphragm Backing Pump	-	✔	✔	✔
Ultimate Vacuum (Torr)	3×10^{-2}	Less than 9×10^{-6}	2×10^{-6}	2×10^{-6}
Power Supply	DC, 80 W	RF, 300 W	DC, 1000 mA DC, 1000 mA	DC, 1000 mA
Dimensions (H×W×D) cm	45×50×37	50×65×51	50×60×47	50×60×47
Chamber Dimensions (OD×H) mm	170 ×140	300 ×200		
Chamber	Cylindrical Pyrex Chamber			
Other Features	• Rotating sample holder • 7 inch touch screen control panel • Quartz crystal thickness monitor (1 nm precision) • Intuitive touch screen with colored display unit			

About Company

Name of company	Nanostructured Coatings Co.
Website	www.pvd.ir
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Nanotechnology in Product

Sputtering is an exceptional method for deposition of different coatings. In this process by controlling the functional parameters, thin films, and nanostructured or nanocomposite coatings can be produced.

Desk Thermal Coater System

Introduction

Desk Thermal Evaporator is a common device which operates based on physical vapor deposition (PVD). Thermal evaporation is one of the simplest forms of PVD and typically uses a resistive heat source to evaporate a solid material in a vacuum environment to form a thin film. The material is heated in a high vacuum chamber until vapor pressure is produced. The evaporated material, or vapor stream, traverses the vacuum chamber with thermal energy and coats the substrate.

Application

- Co-deposition of several components to form alloy films.
- Deposition of both metals and nonmetals, including aluminum, chrome, gold, indium, and many others.
- Formation of multilayer coatings.
- Deposition of thick indium layers for wafer bonding.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	DTT
Vacuum Pump	• 60 L/s Turbomolecular Pump • Diaphragm Backing Pump
Ultimate Vacuum (Torr)	Less than 2×10^{-8}
Chamber	Cylindrical Pyrex chamber
Chamber Dimensions (OD×H) mm	300 ×200
Power Supply	DC Power Supply, 0-100 A
Evaporation Source	3 Independent Heat Resistance Sources
Substrate Heater Temperature	Up to 500 °C
Dimensions (H×W×D) cm	50×50×55 cm
Other Features	• Rotating sample holder • 7 inch touch screen control panel • Quartz crystal thickness monitor (1 nm precision) • Intuitive touch screen with colored display unit

About Company

Name of company	Nanostructured Coatings Co.
Website	www.pvd.ir
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Nanotechnology in Product

Thermal evaporation as the simplest forms of PVD technology can be used for deposition of thin films, nanocomposite and nanostructured coatings.

Pulsed Laser Deposition System & Thermal Evaporator (PLD-T)

Introduction

PLD-T is a high vacuum thin film deposition system which uses both pulsed laser deposition and thermal evaporation techniques for deposition of different materials. Pulsed Laser Deposition (PLD) is one of the physical vapor deposition techniques that widely applied in bottom-up nanotechnology. In this process, target materials are vaporized by a high-power pulsed laser beam in the vacuum chamber and deposited as a thin film onto the substrate. PLD has gained a great deal of attention in the past few years for its ease of use and success in depositing materials of complex stoichiometry.

Application

- Deposition of complex materials and crystalline structures.
- Formation of hard coatings and complex ceramic oxides.
- Promising method for deposition of novel nanostructured gas sensitive layers such as V_2O_5 and SnO_2.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	PLD-T
Vacuum Pump	300 L/s Turbomolecular Pump Diaphragm Backing Pump
Ultimate Vacuum (Torr)	Less than 2×10^{-6}
Power Supply	High Current Power Supply, 2.5 kW
Chamber	Stainless Steel Cylindrical Chamber with Four 2-inch Windows
Chamber Dimensions (OD×H) mm	300 ×200
Laser Beam Incidence Angle	45° to 90°
Multi-Target Carousel	3 Target with 1-inch Diameter
Maximum Substrate Size	2 inch
Substrate Heater Temperature (°C)	Up to 500
Film Thickness Uniformity	± 3% over 90% of a 2-inch diameter substrate
Other Features	• 3 thermal sources and special feedthrough • Quartz crystal thickness monitor (1 nm precision) • 7 inch touch screen control panel • Rotating sample holder • Target manipulator with adjustable rotation speed

About Company

Name of company	Nanostructured Coatings Co.
Website	www.pvd.ir
Email	info@pvd.ir

Nanotechnology in Product

The possibility to control the morphological and structural characteristics of the ultimate structure by precisely manipulating the experimental parameters makes PLD one of the most promising techniques for the formation of thin films and nanostructured coatings.

Magnetron Sputtering System

Introduction

Magnetron Sputtering system is base on Physical Vapor Deposition (PVD) technology, in which plasma is created and positively charged ions from the plasma are accelerated by an electrical field superimposed on the negatively charged electrode or "target". The positive ions are accelerated by potentials ranging from a few hundred to a few thousand electron volts and strike the negative electrode with sufficient force to dislodge and eject atoms from the target. These atoms will be ejected in a typical line-of-sight cosine distribution from the face of the target and will condense on surfaces that are placed in proximity to the magnetron sputtering cathode.

Application

- Deposition of wide rang of coatings on different substrates, especially for large-scale deposition.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	S1	S3T4BR	S7P
No. of Cathodes	1	3	7
Vacuum Pump	Rotary Pump and Turbomolecular Pump		
Base Vacuum (mbar)	10-5		
Target Displacement	Linear Motion		
Sample Holder Displacement	Linear Motion		
Sample Holder Features	Rotating Holder Equipped with Heating System		
Power (W)	1000		
Input Power	Three-phase Electric Power, Alternating Current (AC), 230 V		

About Company

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Nanotechnology in Product

Magnetron sputtering is an exquisite method for deposition of different coatings. In this process by controlling the functional parameters, nanostructured or nanocomposite coatings can be produced.

DC/RF Magnetron Sputtering System

Introduction

DC/RF Magnetron Sputtering system is a thin film deposition system based on physical vapor deposition (PVD) technology. In magnetron sputtering process, by application of a high voltage that can be either DC or RF, the magnetically confined plasma is created between the target material (cathode) and the substrate (anode). The positively charged energetic ions from the plasma collide with the negatively charged target material, and atoms from the target are ejected or “sputtered”, which then deposit on a substrate. Magnetron sputtering is a low-cost and easy control method for deposition.

Application

- Deposition of metallic and insulating coatings on different substrates, especially for large-scale deposition.
- Formation of conductive and non-conductive coatings on large scale samples.

Certificates and standards

- Certificate of Nanotechnology

The magnetron sputtering systems provided by this company, known as Omega systems, are designed and produced in ten different models.

Technical specifications

Device Models	401	402	403	404	405	406	407	408	409	410
Electron Beam (EB) Thermal Evaporation DC/RF Sputtering	EB	TE	DC RF	EB TE	TE DC	TE RF	BE DC	EB RF	TE DC RF	EB DC RF
2-inch Sputter Gun	-	-	2	-	1				-	-
Tungsten Boot	-	3	-	1			-	-	1	
Crystal Thickness Gauge	1	3	2						3	
Shutter	1	3	2						3	
Base Vacuum (Torr)	10^{-6}									
Controlling System	HMI + PLC									
Vacuum Pump	Rotary Pump and Diffusion Pump DP150									
Pressure Gauge	2 Pirani Gauges Cold Cathode Pressure Gauge									
Discharge Valve	2 Independent Valves									
Inlet and Outlet Valves	Needle, Aeration, Direct, Backing and High Vacuum Valves									
Chamber	Cylindrical Shape Made of Stainless Steel									
Heating System Temperature (°C)	up to 150									

About Company

Name of company	Yar Nikan Saleh Co.
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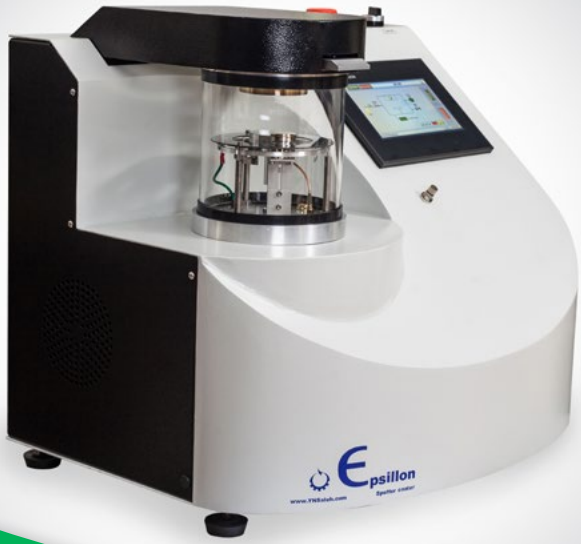
Nanotechnology in Product

Magnetron sputtering is an exquisite method for deposition of different coatings. In this process by controlling the functional parameters, nanostructured or nanocomposite coatings can be produced.



Sputter Coater

Introduction

Sputter Coater is a coating system for deposition of metals, semiconductors and dielectric materials on different substrates. The sputtering process involves ejecting material from a target onto a substrate such as a silicon wafer. An important advantage of this method is that even materials with very high melting points are easily sputtered, while evaporation of these materials in a resistance evaporator is problematic or impossible.

Application

- Deposition of a thin layer of conducting material on non-conducting or poorly conducting sample prior to investigation by a scanning electron microscope (SEM).
- Formation of conductive coatings on large scale samples.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	Epsillon	Epsillon+
Power Supply	DC Power Supply, 150 W	DC Power Supply, 150 W Pulsed Power Supply, 100 W (Adjustable Voltage)
Plasma Treatment	-	✔
Source	DC Sputtering	
Base Vacuum (Torr)	10^{-2}	
Controlling System	HMI + PLC	
Vacuum Pump	Rotary Pump	
Pressure Gauge	Pirani Gauge	
Inlet and Outlet Valves	Needle, Aeration and Electrical Gas Valves	
Chamber	Cylindrical Shape Made of Glass	
Chamber Diameter (mm)	150	
Other Features	• Crystal Thickness Gauge • Flow Controller Valve • 2-inch Sputter Gun	

About Company

Name of company	Yar Nikan Saleh Co.
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Nanotechnology in Product

Sputtering is an exceptional method for deposition of different coatings. In this process by controlling the functional parameters, thin films, and nanostructured or nanocomposite coatings can be produced. Furthermore, in the field of electron microscopy, it can be used for coating a thin layer of carbon or noble metal on sample for high resolution imaging and microanalysis.

Sputtering System

Introduction

Sputtering system is a thin film deposition device at the core of today's semiconductors, disk drives, CDs, and optical devices industries. On an atomic level, sputtering is the process whereby atoms are ejected from a target or source material that is to be deposited on a substrate - such as a silicon wafer, solar panel or optical device - as a result of the bombardment of the target by high energy particles.

Application

- Deposition of metallic and insulating coatings on different substrates, especially for large-scale deposition.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	Sigma 301	Sigma 302	Sigma 303
Source	DC Sputtering	RF Sputtering	Resistive Thermal Evaporation
Power Supply	DC Power Supply, 800 V, 1 A	RF Power Supply, 200 W	High Current Power Supply, 800 W
Crystal Thickness Gauge	2	1	1
Shutter	2	1	1
Rotating Sample Holder	✔	✔	✔
2-inch Sputter Gun	2	1	-
Tungsten Boot	-	-	3
Base Vacuum (Torr)	10^{-5}		
Controlling System	HMI + PLC		
Vacuum Pump	Rotary and Diffusion Pumps		
Pressure Gauge	Pirani Gauge		
Discharge Valve	One Discharge Valve		
Inlet and Outlet Valves	Needle and Aeration Valves		
Chamber	Cylindrical Shape Made of Glass		
Chamber Diameter (mm)	300		

About Company

Name of company	Yar Nikan Saleh Co.
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Nanotechnology in Product

Sputtering is an exquisite method for deposition of different coatings. In this process by controlling the functional parameters, nanostructured or nanocomposite coatings can be produced.

Manufacturing Equipment

Chemical Vapor Deposition Tools

- Thermal Chemical Vapor Deposition (TCVD)
- Plasma Enhanced Chemical Vapor Deposition System
- Chemical Vapor Deposition System
- Chemical Vapor Deposition System
- Plasma Enhanced Chemical Vapor Deposition System
- Plasma Enhanced Chemical Vapor Deposition System
- Plasma Enhanced Chemical Vapor Deposition System

Thermal Chemical Vapor Deposition (TCVD)

Introduction

Thermal Chemical Vapor Deposition (TCVD) is a thin film deposition system. It can also be used as a surface finishing process for improving the lifetime and performance of tools. In TCVD process usually heating lamps or other methods are used to rapidly heat a substrate; then the heated substrate is exposed to one or more volatile precursors which react or decompose on the substrate surface to produce a layer.

Application

- Synthesis of nanomaterials such as nanotubes, graphene, etc.
- In microfabrication processes to deposition materials in different forms, including monocrystalline, polycrystalline, amorphous, and epitaxial.
- Fabrication of semiconductors and related devices - integrated circuits, sensors and optoelectronic devices.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	TCVD-1Z	TCVD-2Z	TCVD-3Z
No. of Heating Zones	1	2	3
Power (kW)	2.5	3	3.5
Dimensions (H×L×W) cm	85×50×60	85×60×60	85×70×60
Vacuum Pump	Rotary Pump		
Base Vacuum (mbar)	10^{-2}		
Pressure Gauge	Digital Gauge, Pirani Gauge, Penning Gauge		
Reactor	Quartz Tube		
Temperature Control	PID with 10 Thermal Programs		
Heating System	• Type I: Fe-Cr-Al Element, Tmax=1100 °C, Heating Rate=25 °C/min • Type II: 4.5 kW Thermal lamp, Tmax=750 °C, Heating Rate=200 °C/min		

About Company

Name of company	Advanced Equipment Engineering Co.
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Nanotechnology in Product

TCVD is extremely useful in the process of atomic layer deposition and formation of extremely thin layers of material. Furthermore, it can be used for synthesis of nanomaterials such as carbon nanofibers, carbon nanotubes and graphene.

Plasma Enhanced Chemical Vapor Deposition System

Introduction

PECVD is a well-established system for deposition of a wide variety of thin films. It enables deposition at lower temperatures by using plasma, generated by introducing reactant gases between parallel electrodes-a grounded electrode and an RF-energized electrode. The capacitive coupling between the electrodes excites the reactant gases into plasma, which induces a chemical reaction and results in the reaction product being deposited on the substrate.

Application

- Deposition of insulating or conductive semiconductor coatings in electronics.
- Production of hydrophilic and hydrophobic coatings in the textile industry.
- Manufacturing of anti-reflective or scratch-resistant coatings in optics.
- Deposition of wear resistant coatings or preventing corrosion in mechanical engineering to increase tool life.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	PECVD200	PECVD500
Power (W)	200	500
Vacuum Pump	Turbomolecular Pump	
Base Vacuum (mbar)	7-10	
Cathode	RF Cathode Made of Copper with 90 mm Diameter	
RF Power Supply	13.56 MHz, 50 ff, 220 V, Air-cooled	
Impedance Matching System	13.56 MHz, 220 V, N-type connector, Compressed Air	
Chamber Inner Dimensions (H×D) mm	250×266	
Process Temperature (°C)	Max. 350	
Wafer Size (cm)	Max. 10×10	

About Company

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Nanotechnology in Product

PECVD is an atomistic deposition method which can provide highly pure materials with structural control at atomic or nanometer scale level. Moreover, it can produce single layer, multilayer, composite, and nanostructured coating materials.

Chemical Vapor Deposition System

Introduction

Chemical Vapor Deposition (CVD) is a widely used system for preparing thin films and nanomaterials. The way CVD works is by combining gas molecules (often using carrier gases) in a reaction chamber which is typically set at ambient temperature. When the combined gases come into contact with the substrate within the reaction chamber (which is heated), a reaction occurs that creates a material film on the substrate surface. The waste gases are then pumped from the reaction chamber.

Application

- Deposition of coatings resistant to wear, corrosion, friction and high temperatures in mechanical engineering.
- Synthesis of nanomaterials such as nanotubes, graphene, etc.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	3Z.M.T.D.I.900
No. of Heating Zone	Triple Zone System
Max. Temperature (°C)	900
Reactor	Quartz Tube
Power (kW)	6
Input Power	Three-phase Electric Power

About Company

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Nanotechnology in Product

CVD is an atomistic deposition method which can provide highly pure materials with structural control at atomic or nanometer scale level. Moreover, it can produce single layer, multilayer, composite, and nanostructured coating materials.

Chemical Vapor Deposition System

Introduction

Chemical Vapor Deposition (CVD) is a widely used materials-processing system. This technology involves introducing a precursor gas or gases into a chamber containing one or more heated objects to be coated. Chemical reactions occur on and near the hot surfaces, resulting in the deposition of a thin film on the surface. This is accompanied by the production of chemical by-products that are exhausted out of the chamber along with unreacted precursor gases.

Application

- Synthesis of graphene and other 2D materials like MoS2.
- Fabrication of semiconductor and Photovoltaic devices.
- Applying wear resistant coatings or preventing corrosion in mechanical engineering to increase tool life.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	CVD	RS-CVD (RS Stands for Rail Sliding)
No. of Heating Zones	Single, Double and Triple	Single
Heating System	Silicon Carbide Element	Nichrome Element
Max. Temperature (°C)	1350	1250
Heating Zone Length (cm)	22	
Vacuum Pump	Rotary Pump Diffusion and Turbomolecular Pumps (optional)	
Vacuum Gauge	Pirani Gauge	
Reactor	Quartz or Alumina or Stainless Steel Tubes	

About Company

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Nanotechnology in Product

CVD as a common nanofabrication technique is extremely useful to deposit thin layers of material onto a substrate. It can also be used for synthesis of a wide range of nanomaterials, including nanotubes and 2D materials like graphene.

Plasma Enhanced Chemical Vapor Deposition System

Introduction

PECVD is a low-temperature thin film deposition system compared with conventional CVD. The lower deposition temperatures are critical in many applications where CVD temperatures could damage the devices being fabricated. In this system, deposition is achieved by introducing reactant gases between parallel electrodes-a grounded electrode and an RF-energized electrode. The capacitive coupling between the electrodes excites the reactant gases into plasma, which induces a chemical reaction and results in the reaction product being deposited on the substrate.

Application

- Deposition of wear resistant coatings or preventing corrosion in mechanical engineering to increase tool life.
- Synthesis of thin films and nanomaterials like carbon nanotubes.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	Lab PECVD	Mini PECVD	Tubular PECVD
Vacuum Pump	Rotary Pump		
Vacuum Gauge	Pirani Gauge		
Base Vacuum (mbar)	0.08	0.08	10^{-3}
Process Temperature (°C)	600	550	900
Pressure Control	Manually	Manually	Automatic
Temperature Control	Automatic		
Controlling System	PLC+HMI		
Chamber	Stainless Steel Chamber Placed in Horizontal Position		
Input Power	Three-phase Electric Power		
Other Features	• Digital flow meter for gas control • External heating system • Liquid nitrogen cold trap for vacuum filtration		

About Company

Name of company	Plasma Fanavar Amin Co.
Website	www.plasmafanavar.com
Email	info@plasmafanavar.com

Nanotechnology in Product

PECVD is a widely used technique to produce thin film materials. It can also be used for synthesis of nanomaterials, especially carbon based nanostructures like nanotubes, nanofibers and graphene.

Plasma Enhanced Chemical Vapor Deposition System

Introduction

Plasma Enhanced Chemical Vapor Deposition (PECVD) is a system by which thin films of various materials can be deposited on substrates at a lower temperature than that of standard CVD. In PECVD process, deposition is achieved by introducing reactant gases between parallel electrodes-a grounded electrode and an RF-energized electrode. The capacitive coupling between the electrodes excites the reactant gases into plasma which induces a chemical reaction and results in the reaction product being deposited on the substrate.

Application

- Applying wear resistant coatings or preventing corrosion in mechanical engineering to increase tool life.
- Synthesis of nanomaterials, especially carbon based materials, including nanotubes, nanofibers and graphene.
- In nanofabrication for deposition of thin films.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Max. Temperature (°C)	600
Base Vacuum (mbar)	5×10^{-2}
Power (kW)	30

About Company

Name of company	Plasma Pazhouh Pars
Website	www.plasmapazhouh.ir
Email	info@plasmapazhouh.ir

Nanotechnology in Product

PECVD is a widely used technique to produce thin film materials. It can also be used for the synthesis of nanomaterials, especially carbon based nanostructures like nanotubes, nanofibers and graphene.

Plasma Enhanced Chemical Vapor Deposition System

Introduction

Plasma Enhanced Chemical Vapor Deposition (PECVD) is a hybrid CVD system used to deposit thin films. In PECVD process plasma generates between two parallel electrodes. A precursor gas mixture is introduced in the reactor and plasma is used to create reactive and energetic species by collision. The reactive species diffuse through the sheath to adsorb on and interact with the substrate surface, and a layer of material forms on the substrate surface. Reaction byproducts are then pumped away by the pumping system.

Application

- Applying coatings resistant to wear, corrosion, friction and high temperatures in mechanical engineering.
- Synthesis of carbon nanotubes and graphene.
- Deposition of insulating or conductive semiconductor coatings in electronics.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	DC-PECVD
No. of Heating Zone	Double Zone System
Max. Temperature (°C)	750
Base Vacuum (Torr)	5×10^{-2}
Reactor	Quartz Tube
Power Supply	High Voltage Power Supply, 1000 V
Wafer Size	Max. 3 inch
Dimensions (H×L×W) cm	180×140×60

About Company

Name of company	Roshd-e Nano Fanavaran
Website	www.rnfco.ir
Email	info@rnfco.ir

Nanotechnology in Product

PECVD is a well-established technique for deposition of a wide variety of films. It can also be used for synthesis of nanomaterials, especially carbon based nanostructures like nanotubes, nanofibers and graphene.

Manufacturing Equipment

Solution Deposition Tools

- Dip Coater
- Spin Coater
- Coating Process Unit
- Spin Coater
- Spin Coater

Dip Coater

Introduction

Dip Coater is a highly accurate thin film deposition instrument. Its principle is as simple as dipping the substrate into the initial solution before withdrawing it at a constant speed. During which the solution naturally and homogeneously spreads out on the surface of the substrate by the combined effects of viscous drag and capillary rise. Evaporation then takes over and leads to solidification of the final coating. Fine tuning of the withdrawal speed and evaporation conditions (temperature and relative vapor pressures) is necessary to perfectly control the film characteristics (thickness and inner structure).

Application

- Multilayer sensor coatings
- Hydrogels
- Sol-gel nanoparticle coatings
- Self-assembled monolayers
- Layer-by-layer nanoparticle assemblies.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Motor Power	2.4 kN.m
Accuracy with 25 g Load	6%
Max. Load (g)	250
Speed Monitoring	PLC
Pulling Rate (mm/min)	5-100
Effective Height of Pulling (mm)	150
Max. Specimen Dimension (cm)	3×5×15
Dimensions (cm)	85×60×60

About Company

Name of company	Advanced Equipment Engineering Co.
Website	www.adeeco.ir
Email	info@adeeco.ir

Nanotechnology in Product

Dip Coaters are designed to deposit layers of materials in a controlled and repeatable manner. Films of various thicknesses can be deposited, from monolayers to multilayered structures.

Spin Coater

Introduction

Spin Coater is a widely used and versatile system for depositing materials onto substrates with accurate and controllable film thicknesses. In this process, a substrate is fixed onto the chuck using a vacuum pump. Usually, a small amount of coating material is applied on the center of the substrate, which is either spinning at low speed or not spinning at all. The substrate is then rotated at high speed in order to spread the coating material by centrifugal force. Rotation is continued while the fluid spins off the edges of the substrate until the desired thickness of the film is achieved.

Application

- Deposition of photoresist layer for pattering wafer in microcircuit production.
- Deposition of sol-gels.
- Coating of insulating layers for microcircuit fabrication.
- Fabrication of antireflection coatings and conductive oxides.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Working Voltage	220 V AC
DC Power (V)	24
Spin Speed (rpm)	800 to 9000
Speed Tolerance (rpm)	± 30
Deposition Time (s)	Up to 500
Monitoring	Digital
Dimensions (cm)	26×38×32
Weight (kg)	16

About Company

Name of company	Advanced Equipment Engineering Co.
Website	www.adeeco.ir
Email	info@adeeco.ir

Nanotechnology in Product

Spin Coater is an easy and efficient tool for precise and uniform deposition of thin and ultra-thin films on flat substrates for a variety of applications.

Coating Process Unit

Introduction

Coating Process Unit is a combination of coating and baking equipment; it is an efficient tool for fabricating a film on a substrate. Thin-resist layers for photolithography can be coated with this machine. The process starts with the dilution of the material to be deposited in a solvent. The solution is subsequently dispensed on the substrate surface. The wafer is then spun at a high speed. The thickness of the film is determined by the spinning speed, surface tension, and viscosity of the solution. The solvent is removed partly during the spinning process due to evaporation and partly by subsequent baking at elevated temperatures.

Application

- Deposition of thin-resist layers for photolithography.
- Fabrication thin film coatings.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	CPU-8000
Spin Speed (rpm)	500 to 800
Ramp Step	3 Different Ramps
Soft Bake Temperature (°C)	60-110
Hard Bake Temperature (°C)	80-150
Process Control	Manual/ Semi-auto
Max. Wafer Size (mm)	100

About Company

Name of company	Azhine Micro System Co.
Website	www.azhineh.ir
Email	info@azhineh.ir

Nanotechnology in Product

Coating Process Unit is suitable for deposition of thin film coatings, especially deposition of photoresist layer for pattering wafer in microcircuit production.

Spin Coater

Introduction

Spin Coater is a common device for the preparation of thin and ultra-thin films of any kind of material (photoresist, and other varnishes, polyimides, sol-gels, etc.) on any kind of flat substrate (copper, silicon, glass, plastic, etc.). In this process, a liquid or pasty substance is dispensed on a rapidly rotating substrate. The substance is radially spun outward due to the occurring centrifugal forces, leaving a thin film (in the nm - ×m range) on the substrate.

Application

- Photoresist for defining patterns in microcircuit fabrication.
- Dielectric/insulating layers for microcircuit fabrication.
- Magnetic disk coatings.
- Flat screen display coatings.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	2M.T.D.I.92
Spin Speed (rpm)	200 to 7000
Device Chamber	Material: Steel
Wafer Dimension (mm)	10 to 100
Vacuum Pump	Rotary Pump
Base Vacuum (bar)	0.8
Dimensions (cm)	35×30×30

About Company

Name of company	Nano Ebtekar Paydar
Email	sanaterooz@yahoo.com

Nanotechnology in Product

Spin Coater is an ideal tool for depositing thin films of any kind of material with finely controlled and reproducible thickness on any kind of substrate.

Spin Coater

Introduction

Spin Coater is a standard device which involves depositing thin films of materials, often polymers, uniformly on flat substrates by employing the concept of centrifugal force. In this process the solution, for instance, a photosensitive resist, is dispensed at the center of the wafer. Subsequent acceleration as well as the rotation speed and the time allotted to the individual steps ensure that a homogeneous layer thickness remains after excess resist is spun off. Alongside the process parameters, the physical properties of the solution or photoresist determine the thickness of the applied film.

Application

- Spin coating of polymers, light-sensitive materials, photoresists and biocompatible materials such as PDMS.
- Fabrication of MEMS components, electronic chips and nano-coatings.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	SC5	SC12	SC12i
Spin Speed (rpm)	Up to 6000	Up to 12000	Up to 5000
Dimensions (cm)	30×30×48	30×30×48	30×48×48
Angular Acceleration (rpm/s)	0 to 450		
Input Power	Single-phase, 230 V AC		
Wafer Diameter (cm)	Up to 15		
Other Features	SC12i Model is equipped with automatic injection system		

About Company

Name of company	Samane Tajhiz Danesh
Email	samanetajhiz@gmail.com

Nanotechnology in Product

Spin Coater is widely used in the semiconductor industry, as one of the applications of thin films, creating thin films with thicknesses below 10 nm of even high quality thickness.

Manufacturing Equipment

Plasma Surface Processing Equipment

- PlasmaTex (Textile Plasma Processing Unit)
- PlasmaDEJ (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

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	Plas-maTex 20160	Plas-maTex 30220	Plas-maTex 40160	Plas-maTex 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	www.adeeco.ir
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 Fanavaran-e Nasir
Website	www.basafan.com
Email	info@basafan.com

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	www.satiaco.com
Email	satiacompany@gmail.com

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.

KAVOSH YARAN

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	www.ad-kavoshyaran.ir
Email	info@ad-kavoshyaran.ir

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.

KAVOSH YARAN

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 (cm2)	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	www.ad-kavoshyaran.com
Email	info@ad-kavoshyaran.ir

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
Website	www.psptrade.com
Email	info@psptrade.com

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	www.jam-plasmatech.com
Email	info@jam-plasmatech.com

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 Ide Azma Engineering Co.

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

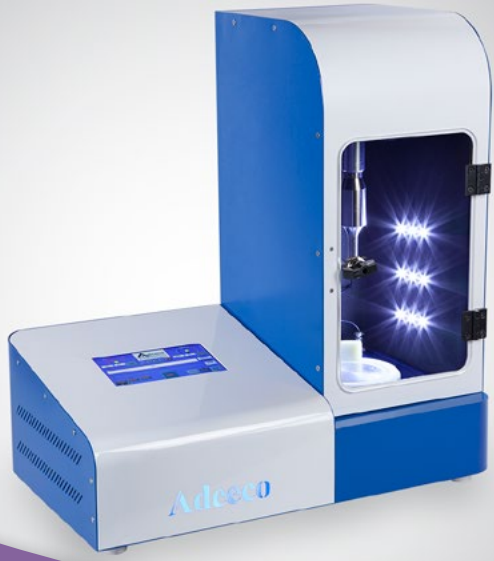
Nanotechnology in Product

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.

Manufacturing Equipment

Homogenizing Equipment

- Ultrasonic Homogenizing System
- Ultrasonic Homogenizing System
- Ultrasonic Homogenizing System
- Nano Cavitation System
- Ultrasonic Homogenizing System



Ultrasonic Homogenizing System

Introduction

Ultrasonic homogenizing system is a multi-function tool which utilizes intense high-frequency sound for emulsification, nanoparticle dispersion, acceleration of chemical reactions, etc. In this system, homogenization is based on cavitation. When the probe tip is immersed in the solution, intense high frequency sound waves coming from the probe tip induce cavitation. When the bubbles reach a certain size, they collapse violently. During this implosion, very high pressures and high-speed liquid jets are generated locally. The resulting currents and turbulences disrupt particle agglomerates and lead to violent collisions between individual particles.

Application

- Particle size reduction.
- Extraction of ingredients.
- Acceleration of chemical reactions.
- Production of the finest emulsions.
- Mixing, dispersing, homogenizing and dissolving of powders in liquids.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	APU500a	APU500b	APU500c	APU1500
Output Power (W)	500			1500
Temperature Control	0-100 °C	-	-	-
Heating & Cooling System	✔	-	-	-
Sound-proof Box	✔	✔	-	-
Probe Holder	✔	✔	✔	✔
Weight (kg)	22	15	10	22
Probe	Titanium Probe with 12 mm Diameter			
Input Power	220 V, 50-60 Hz			
Working Frequency (kHz)	20			
Operation Mode	Continuous or Pulse Mode			

About Company

Name of company	Advanced Equipment Engineering Co.
Website	www.adeeco.ir
Email	info@adeeco.ir

Nanotechnology in Product

Ultrasonic homogenizing system is a very efficient tool in nanotechnology since it can be used in creating emulsions, dispersing nanoparticles, and reducing the size of particles in suspension.

Behin Tamin Ahura

Ultrasonic Homogenizing System

Introduction

Ultrasonic homogenizing system is a multi-function tool which utilizes intense high-frequency sound for emulsification, nanoparticle dispersion, acceleration of chemical reactions, etc. Basically, an ultrasonic homogenizer has a tip which very rapidly vibrates, causing bubbles in the surrounding solution to rapidly form and collapse. This creates shear and shock waves which tear apart cells and particles.

Application

- Creation of emulsions and suspensions.
- Disruption of tissues and cells.
- Mixing, blending, emulsifying, and homogenizing solutions.
- Particle size reduction.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	BTA-UHL1200 (Lab-scale)	BTA-UHL2500 (Industrial-scale)
Output Power (W)	1200 (adjustable from 0 to 100%)	2500 (adjustable from 1800 to 2500)
Input Power	230 V, 50-60 Hz	
Probe	Titanium	
Working Frequency (kHz)	20 (auto-tracking)	
Sample Processing Volume	250 to 4000 mL	50 to 100 Litter per hour
Sound-proof Box	✔	-
Other Features	Temperature sensor (customer order) Timer for adjusting device operation time	

About Company

Name of company	Behin Tamin Ahura Co.
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Nanotechnology in Product

Ultrasonic homogenizing system is an efficient tool in nanotechnology since it can be used in particle size reduction, cell disruption, creating emulsions, and dispersion of nanoparticles.





Ultrasonic Homogenizing System

Introduction

Ultrasonic homogenizing system is a multi-purpose tool which utilizes intense high-frequency sound for emulsification, nanoparticle dispersion, acceleration of chemical reactions, etc. Basically, an ultrasonic homogenizer has a tip which very rapidly vibrates, causing bubbles in the surrounding solution to rapidly form and collapse. This creates shear and shock waves which tear apart cells and particles. Indeed, cavitation forces are high enough to break even covalent bonds.

Application

- Nanoparticles dispersion.
- Breaking up of cells and subcellular structures.
- Speed up chemical reactions.
- Creation of dispersions and suspensions.
- Dissolution of hard-to-dissolve and extremely hard-to-dissolve substances in fluids.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	150R/ 150UT	300R	400R/ 400UT	400IM	1200UT	1200IM	1600R
Output Power (W)	150	300	400	400	1200	1200	1600
Probe Diameter (mm)	4	4	7 or 14	45	16	50	3, 7 or 14
Thermometer	✔	-	-	-	✔	✔	✔
Sound-proof Box	-	✔	✔	-	✔	-	-
Probe	Titanium Probe						
Working Voltage	220						
Working Frequency (kHz) (V)	24						
Operation Mode	Continuous or Pulse Mode						

About Company

Name of company	Fanavari Iranian Pazhouhesh Nasir (FAPAN)
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Nanotechnology in Product

Ultrasonic homogenizing system is a very efficient tool in nanotechnology since it can be used in preparing emulsions, dispersing nanoparticles, and reducing the size of particles in suspension.

Nano Cavitation System

Introduction

Nano Cavitation System is an innovative tool for dispersion of nanoparticles in a liquid or creation of suspensions and emulsions. The heart of the system is a reactor which is responsible for producing nano-bubbles. When the fluid is pumped through the reactor under high pressure, the bubbles heterogeneously nucleate in the fluid and by reaching to their critical size, implode near the reactor outlet and generate high energies. This high energy can disintegrate the secondary phases (liquid or solid). The resulting implosion waves can be strong enough to breakdown even covalent bonds.

Application

- Creation of nanoemulsions.
- Dispersion of nanoparticles in liquids.
- Mixing and homogenizing.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	HC-LE	HC-B-M	HC-L-M	HC-P
Capacity (L)	2	3	5	
Working Pressure (bar)	Up to 80	Up to 50	Up to 50	Up to 100
Main Pump Flow (L/min)	-	5	10	50
Power (kW)	2	2.5	8	15
Dimensions (cm)	50×50×50	70×70×50	120×70×100	150×100×120
Controlling System	-	PLC		
Material	304 Stainless Steel			

About Company

Name of company	Payamavaran Nanofanavari Fardanegar
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Email	info@pnf-co.com

Nanotechnology in Product

Nano Cavitation System is a novel and efficient tool in nanotechnology with the ability to produce nanoemulsions, dispersing nanoparticles in liquids, mixing and homogenizing.

Ultrasonic Homogenizing System

Introduction

Ultrasonic homogenizing system is very useful for the reduction of soft and hard particles. The homogenization is based on cavitation. When liquids are exposed to the intense ultrasonic sound waves, these waves propagate through the liquid and causing alternating high-pressure and low-pressure cycles. During the low-pressure cycle, high-intensity small vacuum bubbles are created in the liquid. When the bubbles reach a certain size, they collapse violently during a high-pressure cycle. During this implosion, very high pressures and high-speed liquid jets are generated locally. The resulting currents and turbulences disrupt particle agglomerates and lead to violent collisions between individual particles.

Application

- Catalysis and acceleration of chemical reactions.
- Homogenization of substances of all kinds.
- Breaking up of cells and subcellular structures.
- Manufacture of dispersions and suspensions.
- Production of the finest emulsions with minimal droplet size.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	UP-100	UP-200S	UP-400E	UHP-400	UP-1200	UP-2000
Output Power (W)	100	200	400	400	1200	2000
Generator (W, kHz)	200, 20	×	500, 20		1500, 20	3000, 20
Probe Diameter (mm)	3	×	12	12	30	30
Continuous Working Time (min)	10	×	30			
Working Frequency (kHz)	20	28	20			
Input Power	230 V, 50-60 Hz					
Probe	Ti-6Al-4V Probe					
Operation Mode	Pulse Mode					
Working Temperature (oC)	Adjustable from 0 to 100					
Weight (kg)	20					
Other Features	Pt100 Temperature Sensor (1 °C accuracy), 316 Stainless Steel Automatic resonance frequency tracking					

About Company

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Nanotechnology in Product

Ultrasonic homogenizing system is a very efficient tool in nanotechnology since it can be used in particle size reduction, cell disruption, creating emulsions, and dispersion of nanoparticles.

Manufacturing Equipment

Grinding and Mechanical Alloying

- Blade Ball Mill
- Planetary Ball Mill
- Planetary Ball Mill

Blade Ball Mill

Introduction

Blade Ball Mill is a simple and effective unit of grinding and dispersing fine and homogenous material quickly and repeatedly. This system consists of a horizontal container including a series of blades. A powerful motor rotates the blades, which in turn agitate the steel balls in the container. The materials are subjected to various forces such as impact, rotation, tumbling and shear. This causes powder size reduction because of collisions between balls, between balls and container wall, and between balls, shaft, and blades. Therefore, micron and nano-range powder can be easily produced.

Application

- Size reduction of any kind of materials.
- Mechanical alloying.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	NARYA- PGM 800
Motor	20 HP
Blade Rotation Speed (rpm)	1000
Container Volume (L)	8
Working Voltage (V)	Three-phase Electric Power, 380 V AC
Operation Mode	Batch type
Temperature Range (°C)	-20 to 100 (with accuracy of 1°C)
Pressure Range (bar)	0.01 to 2
Dimensions (L×W×H) cm	130×70×100
Weight (kg)	500
Other Features	• Controlling time and rotation speed • Continuous monitoring of pressure and temperature • Grinding under vacuum, air or shielding gases like Ar

About Company

Name of company	Amin Asia Fanavar Pars Co.
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Nanotechnology in Product

Blade Ball Mill is a simple and efficient tool for size reduction of various materials and production of nanopowders. It is also suitable for mechanical alloying and synthesis of nanocomposites.

Planetary Ball Mill

Introduction

Planetary Ball Mills are used wherever the highest degree of fineness is required. Apart from the classical mixing and size reduction, the mills also have the energy input necessary for mechanical alloying processes. In these mills, the grinding jars are arranged eccentrically on the sun wheel of the planetary ball mill. The direction of movement of the sun wheel is opposite to that of the grinding jars. The grinding balls in the grinding jars are subjected to superimposed rotational movements, the so-called Coriolis forces. The difference in speeds between the balls and grinding jars produces an interaction between frictional and impact forces, which releases high dynamic energies. The interaction between these forces produces the high and very effective degree of size reduction.

Application

- Fine grinding of soft, hard to brittle or fibrous materials.
- Synthesis of nanocomposites through mechanical alloying.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	NARYA-MPM 2*250 H	NARYA-MPM 4*250 H
No. of Grinding Stations	2	4
Rotation Speed (rpm)	1-800	1-600
Motor	1 HP	2 HP
Speed Ratio (sun wheel: grinding jar)	1: 2	
Grinding Jar Size (ml)	250	
Grinding Jar Material	Hardened steel	
Working Voltage (V)	220 V AC	
Control System	Adjustable Time and Speed	
Dimensions (L×W×H) cm	73×51×61	90×70×135
Weight (kg)	130	180
Other Features	• Grinding under vacuum or shielding gases like Ar • Equipped with ventilation system	

About Company

Name of company	Amin Asia Fanavar Pars Co.
Website	www.amin-asia.com
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Nanotechnology in Product

Planetary Ball Mills are very efficient tools for the production of any kind of nanomaterials and nanocomposite powders.

Planetary Ball Mill

Introduction

Planetary Ball Mill is a very often used machine for fine grinding of any kind of materials, and also mechanical alloying. This machine consists of several cylindrical grinding jars (positioned on the sun wheel) which are filled with loose grinding balls. Two superimposed rotational movements move the grinding jars. Like in a planetary system the grinding jar rotates on an orbit around the center. This rotational movement is the self-rotation of the grinding container superimposed. The resulting centrifugal and acting acceleration forces lead to strong grinding effects. Furthermore, there are forces working according to the Coriolis acceleration. The result is an intensive grinding effect between the grinding balls and the sample.

Application

- Fine grinding of soft, hard to brittle or fibrous materials.
- Synthesis of nanocomposites through mechanical alloying.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Working Voltage	220 V AC
No. of Grinding Stations	2
Grinding Jar Volume (ml)	200
Grinding Jar Material	Wear-resistant Teflon, Hardened steel or Ceramic
Grinding Balls Material	Steel or Ceramic
Grinding Balls Diameter (mm)	3 to 10
Dimensions (L×W×H) cm	60×60×70
Weight (kg)	60
Other Features	• 2 independent motors for planetary and centrifugal movement • Grinding under vacuum or shielding gases like Ar • Programmable time and rotation speed • Emergency stop switch

About Company

Name of company	Nano Shargh Abzar-e Toos Co.
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Nanotechnology in Product

Planetary Ball Mill enables the grinding of soft, hard to brittle or fibrous materials to the nano range. It can also be used for the synthesis of nanocomposites through mechanical alloying.

Manufacturing Equipment

Bulk Nanostructured Production Equipment

- Microwave Sintering Furnace
- High Temperature High Vacuum Furnace
- Spark Plasma Sintering System
- Vacuum Hot Press System
- Electromagnetic Stir Casting System
- Pressure Vacuum Casting System

Microwave Sintering Furnace

Introduction

Microwave Sintering Furnace is an effective solution for sintering of various materials. In this furnace heating involves the conversion of electromagnetic energy into thermal energy, which is instantaneous, rapid and highly efficient. Generally, a microwave sintering furnace operates at a 2.45 GHz frequency. The sintering chamber consists of ceramic insulation housing to preserve the heat generated in the workpiece. The temperature is monitored by optical pyrometers, IR sensors and/or sheathed thermocouples placed close to the surface of the sample, and the system is equipped with appropriate equipment to provide the desired sintering atmosphere.

Application

- Sintering of ceramic, metals, alloys, and intermetallics.
- Sintering of metal and ceramic coatings.
- Heat treatment of powders.
- Melting of metals (steel, Cu, Al, etc.)

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	MSV-15-245
Input Power	Three-phase, 380 V, 50 Hz, 2 A
Working Frequency (GHz)	2.45
Base Vacuum (mbar)	0.1
Vacuum Gauge	Pirani Gauge
Max. Temperature (°C)	1500
Temperature Control	Pyrometer/ Temperature Sensor
Chamber Insulation	Ceramic Insulation Housing
Control Panel	PLC+HMI
Crucible Volume (mm^3)	1000

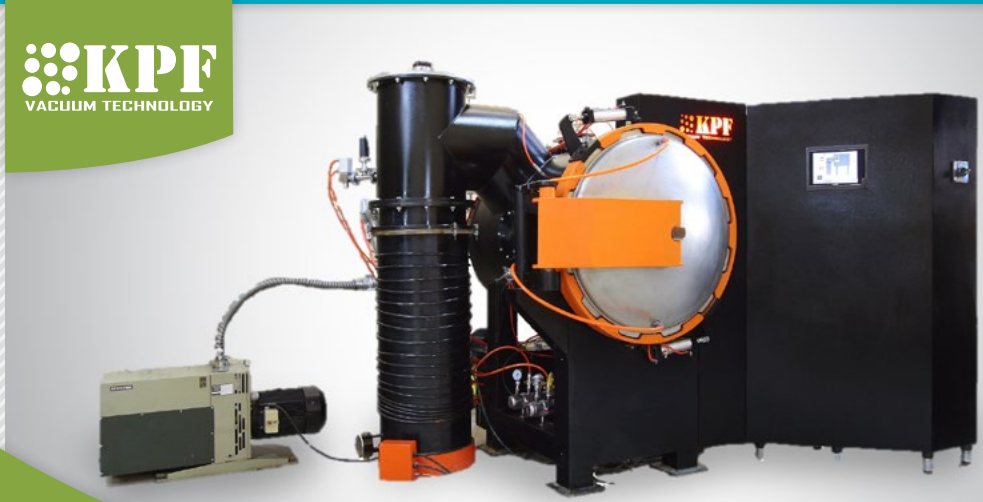
About Company

Name of company	Electrosaman Niroo

Nanotechnology in Product

The use of Microwave Sintering Furnaces in ceramic processing is a relatively recent development. They can be applied effectively and efficiently to heat and sinter ceramic ultrafine powders and nanopowders to produce nanostructured or nanocomposite parts.

KPF
VACUUM TECHNOLOGY



High-Temperature High-Vacuum Furnace

Introduction

High-Temperature High-Vacuum Furnace is widely used for annealing, brazing, sintering and heat treatment of metals, alloys and ceramics with high consistency and low contamination. In this furnace, the product is surrounded by a vacuum during processing. The absence of air or other gases prevents oxidation, heat loss from the product through convection, and removes a source of contamination. This enables the furnace to heat materials to temperatures as high as 2500 °C. Maximum working temperature and vacuum level depend on the melting point and vapor pressure of processing materials.

Application

- Sintering a wide range of engineering ceramics, nitrides, carbides, oxides and etc.
- Annealing, brazing, carburizing, and heat treatment of metals, alloys and ceramics.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	Ezint Slab	Ezint Mlab	Ezint 120F	Ezint 120B
Hot Zone Dimensions (D×L) cm	5×5	10×10	50×60	50×60
Max. Working Temperature (°C)	2200	2200	2200	2300
Ultimate Vacuum Level (mbar)	5×10-2	5×10-2	5×10-5	5×10-5
Positive Pressure (bar)	0	0	2	6
Power (kW)	25	55	160	260
Heating System	Resistance-heated			
Elements and Thermal Isolation	Graphite			
Vacuum System	Rotary Pump and Diffusion Pump with Cold Trap			
Gas Injection Pressure (bar)	Up to 6			
Power Supply	High current power supply with continuous control connected to the central control system			
Temperature Control	High Temperature Thermocouple (pyrometer can also be installed)			
Control Panel	10 inch Touch Screen			
Chamber	• Double-walled and water-cooled Stainless Steel Chamber • Equipped with Door Lock Sensor			

About Company

Name of company	Khala Pooshan Felez Co.
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Nanotechnology in Product

High-Temperature High-Vacuum Furnace is an efficient tool for synthesis of nanostructured materials. For instance, synthesis of some nanostructured materials through sintering process needs applying high temperature to reduce the sintering time.

Spark Plasma Sintering System

Introduction

Spark plasma sintering (SPS) is a synthesis machine which utilizes uniaxial force and a pulsed direct electrical current under low atmospheric pressure to perform high-speed consolidation of the powders. This process is performed in a Graphite die. The mechanical scheme of the process is similar to the uniaxial (die) pressing. The load (commonly up to 100 MPa) is transferred to the powder through the upper punch and the pulsed DC power supply is connected to the upper and lower punches/electrodes.

Application

- Rapid consolidation and sintering of nanophase materials, rare earth permanent magnetic materials, glass, biological materials, and non-equilibrium alloy materials.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	Nanozint 10i
Power Supply	ON-OFF pulse DC
Base Vacuum (mbar)	5×10^{-2}
Inert Gas	Ar, N2
Max. Temperature (°C)	2500
Max. Pressure (ton)	10
Heating System	Induction Mode
Heating Rate (°C/min)	1000
Chamber	Water-cooled Stainless Steel Chamber Equipped with Door Lock Sensor
Temperature Control	Thermocouples: 0 to 800 °C Pyrometer: 800 to 2500 °C

About Company

Name of company	Khala Pooshan Felez Co.
Website	www.khpf.co.ir
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Nanotechnology in Product

Spark plasma sintering is an effective tool for the development of new materials. It offers rapid consolidation of a wide range of nanopowders from all fields of ceramic and metallic materials, enabling significantly improved or even completely novel materials.

Vacuum Hot Press System

Introduction

Vacuum Hot Press is commonly used in powder metallurgy and ceramics for bonding of powders. A hot press tool applies heat and pressure simultaneously to the sample for densification, sintering or changing a material structure. A hot press typically uses punch press setup to apply pressure on the sample. A water-cooled vacuum chamber surrounds the sample and allows the parts to be heated up to the desired temperature in a vacuum or gas environment. Depending on the applied pressure and temperature, different phenomena may occur at the particles interface, consequently leading to the bonding.

Application

- Diffusion Bonding Studies.
- Hot compacting of oxides, nitrides, borides, carbides, and sulfides and mixtures thereof to near theoretical densities.
- Sintering and consolidation of nanopowders.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	Hfzint 10
Base Vacuum (bar)	5×10^{-3}
Max. Temperature (°C)	1600
Power at Max. Temperature (kW)	12
Max. Pressure (ton)	15
Die Heating Rate (°C/min)	500
Die Cooling Rate ((°C/min)	300
Chamber	Water-cooled Stainless Steel Chamber Equipped with Door Lock Sensor
Chamber Volume (L)	50
Temperature Control	Thermocouples(use of pyrometer is also possible)
Dimensions (cm)	120×160×240

About Company

Name of company	Khala Pooshan Felez Co.
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Nanotechnology in Product

Vacuum Hot Press is considered as a main tool in powder metallurgy and ceramics which can be used for sintering of any kind of nanopowders and fabrication of nanocomposite parts.

Electromagnetic Stir Casting System

Introduction

Electromagnetic stir casting system is an effective device to produce metal matrix composites. This system consists of a resistance furnace and an electromagnetic stirrer. In this system, an alternating field induces eddy currents in liquid metal which interact with the field to give a Lorentz body force which is generally rotational and which must, therefore, drive fluid motion. Electromagnetic stirring differs from the conventional mechanical stirrer as it is a non-contact type stirrer in which no part is in contact with the molten metal. The molten metal is mixed with the material by electromagnetic action.

Application

Dispersion of ceramic nanoparticles in molten alloys for fabrication of metal matrix nanocomposites.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Power Supply	Three-phase, Alternating Current, 220 V
Current (A)	20
Stirring Rate (rpm)	Max. 3600
Heating Elements	Ni-Cr
Max. Temperature (°C)	1200
Chamber Material	Stainless Steel
Crucible Volume (L)	1.5
Dimensions (D×H) cm	20×22
Weight (kg)	100

About Company

Name of company	Nanostructured Advanced Materials Technologies Development Co.
Website	www.namadnanotech.com
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Nanotechnology in Product

Electromagnetic stir casting system is a non-contact type stirrer which is suitable for uniform dispersion of ceramic nanoparticles in a liquid alloy for fabrication of metal matrix nanocomposites.

Pressure Vacuum Casting System

Introduction

Pressure Vacuum Casting is an appropriate casting tool for the production of ultra-thin and high-strength components. This machine operates based on the fact that instead of pouring the molten metal into the casting and allowing gravity to be the force that distributes the liquid material through the mold, uses pressure to force the metal through the gating system and the metal casting's cavity. This system usually makes use of a water cooling system to cool down the mold and accelerate the solidification process.

Application

- Production of ultra-thin and high-strength components.
- Casting of nanostructured and amorphous alloys.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	PVC-17
Heating System	Induction Mode
Power Supply	Three-phase, Alternating Current, 400 V
Power (kW)	10
Frequency (kHz)	17
Vacuum Pump	Rotary pump & Diffusion Pump
Base Vacuum (mbar)	5×10^{-4}
Max. Temperature (°C)	1700
Chamber Material	Stainless Steel
Casting Pressure (bar)	5
Coil Dimensions (D×H) mm	85×80
Dimensions (H×L×W) cm	100×60×120
Weight (kg)	250

About Company

Name of company	Nanostructured Advanced Materials Technologies Development Co.
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Nanotechnology in Product

Pressure Vacuum the casting is an applicable tool for casting of amorphous and nanostructured alloys such as metallic glass, because the solidification rate is controllable in this system.

Manufacturing Equipment

Lithography and Etching Systems

- Desktop Lithography System
- Semi-automatic Lithography Rack
- Single & Double Side Optical Mask Aligners
- Deep Reactive Ion Etching System
- Photolithography System
- Contact Lithography System

Desktop Lithography System

Introduction

Desktop Lithography is a photolithography tool which widely used in microfabrication to transfer geometric patterns to a film or substrate. This process generally includes four main steps: photoresist coating, exposure, development and hard-bake. At first, a substrate is coated with photoresist, a liquid polymeric material. The substrate is then exposed on an exposure tool. In standard processes, the system shines light through a photomask which has the master image of the device on it. By shining light through the mask and onto the substrate, individual areas of the photoresist are selectively exposed to light. Once exposed, the substrate is then immersed in a developer solution to dissolve away areas of the photoresist that were exposed to light. After development, the substrate is baked in an oven or hot plate at temperatures between 100-120 °C.

Application

- Fabrication of optical devices, and micro-electromechanical systems (MEMS).
- Research and development in the field of nanoelectronics.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	DEX-365
Wafer Size (in)	1 to 3
Mask Size (in)	1 to 3
Light Source	Wavelength: 365-400 nm Power: UV-100 Beam Size: 4 in
Minimum Feature size (µm)	2
Lithography Process	Semi-auto

About Company

Name of company	Azhine Micro System Co.
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Nanotechnology in Product

Photolithography is the most used top-down approach for patterning at nanoscale, especially in the semiconductor industry.

Semi-automatic Lithography Rack

Introduction

Semi-automatic Lithography Rack is an automated photolithography tool which integrates all steps of patterning, i.e. photoresist coating, exposure, development and hard-bake. This approach results in saving time and money during the process. In this process, a solution of photoresist is deposited on the substrate by spin coating. The substrate is then exposed on an exposure tool. In standard processes, the system shines light through a photomask which has the master image of the device on it. By shining light through mask and onto the substrate, individual areas of the photoresist are selectively exposed to light. A series of chemical treatments then either engraves the exposure pattern into the material or enables deposition of a new material in the desired pattern upon the material underneath the photoresist.

Application

- In a variety of industries including offset printing, screen printing, electronic board, circuit board, semiconductor, etc.
- Research and development in the field of nanoelectronics.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	ALR 365
Spin Speed (rpm)	500 to 8000
Ramp Step	3 Different Ramps
Process Control	Manual/ Semi-auto
Soft Bake Temperature (°C)	60-110
Hard Bake Temperature (°C)	80-150
Wafer Size (in)	1 to 4
Mask Size (in)	1 to 3
Light Source	• Wavelength: 365-400 nm • Power: UV-100 • Beam Size: 4 in
Mask Holding Mechanism	Pneumatic
Sample Loading Mechanism	Auto
Anti-vibration Platform	Damping base

About Company

Name of company	Azhine Micro System Co.
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Nanotechnology in Product

Photolithography is the most used top-down approach for patterning at nanoscale, covering from nanostructured surfaces to advanced micro-nano devices of interest.

Single & Double Side Optical Mask Aligners

Introduction

Single & Double Side Optical Mask Aligners are patterning tools in which a photosensitive polymer is selectively exposed to light through a mask, leaving a latent image in the polymer that can then be selectively dissolved. This process requires three basic materials, light source, photo mask, and photoresist. a photoresist is applied as the first step in applying a pattern in a uniform film. The mask is a metal sheet that holds the actual pattern that will be etched into the photoresist. The mask is cut so that when a UV light is shined from behind the exposed parts of the photoresist will be the actual pattern. These exposed parts can then be cleaned away (positive resist) or will stay on to the fabricated device (negative resist).

Application

- Fabrication of optical devices, and micro-electromechanical systems (MEMS).
- In microfabrication to produce extremely small patterns.
- To create unique micro patterns for invention prototypes.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Type	Single Side Aligner		Double Side Aligner	
Device Models	MA-210405	MA-110365	MAB-210405	MAB-110365
Radation Process	Semi-auto	Auto	Semi-auto	Auto
Sample Holding Mechanism	Pneumatic	Pneumatic auto	Pneumatic	Pneumatic-auto
Mask Holding Mechanism	Vacuum		Vacuum	
Alignment Method	Top-side (TSA)		Top-side (TSA) Back-side (BSA)	
Light Source	Wavelength: 350-380 nm / Power: UV-100 / Beam Size: 4 in			
Alignment Range	X: ± 7.5 mm / Y: ± 7.5 mm / Z: 10 mm / θ: ± 10 degree			
Alignment Stage Resolution	XY Stage: 3 µm		XY Stage: 3 µm Back-side Stage: 20 µm	
Optical Scanning Movement XY (mm)	100×80			
TSA Microscope Stage (Joystick)	Full field XY (mm): 80×110 / Lens: Loop / Scanning Speed (mm/s): 1 to 5			
BSA Microscope Stage	-		Full field XY (mm): 5×50 Max. Magnification: 40X	
Optical Working Distance (cm)	0.9 to 2			
Minimum Feature size (µm)	2			
Anti-vibration Platform	Damping Base			
Alignment Method	Top-side (TSA)			
Wafer Size (in)	1 to 4			
Mask Size (in)	1, 2 and 4			

About Company

Name of company	Azhine Micro System Co.
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Nanotechnology in Product

Photolithography is a critical technology for nanoscale manufacturing, especially in the semiconductor industry.

Deep Reactive Ion Etching System

Introduction

Deep Reactive Ion Etching (DRIE) is routinely used for MEMS manufacturing to create deep microstructures with high aspect ratios. In this process the gases are introduced above an inductive coil placed around a ceramic tube. RF is applied to both the coil, and chuck to create plasma. The substrate is placed on the RF powered chuck, and similar to Reactive Ion Etching, the wafer takes on potential which accelerates etching species extracted from plasma toward the etched surface. Introducing different gases can create a chemical reaction. With this technique, etch profiles are typically anisotropic.

Application

- MEMS device fabrication.
- Research and development in the field of nanoelectronics.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	SI-HV300
Chamber	Material: Aluminum Dimensions: 36×38×30 cm Capacity: 20 L
Vacuum Pump	2 Stage Rotary Pump
Vacuum Base (mTorr)	10
Power Supply	Three-phase Electric Power, 380 V
RF Power Supply	13.56 MHz, 300 W
Max. Wafer Size (mm)	100
Working Gas	SF_6 or CF_4 (Flow Rate: 0-200 cm^3/min) O_2, H_2, N_2 (Flow Rate: 0-500 cm^3/min)
Dimensions (cm)	100×90×100
Weight (kg)	200

About Company

Name of company	Roshd-e Nano Fanavaran
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Nanotechnology in Product

Deep Reactive Ion Etching is a relatively new fabrication method which has been widely used in MEMS fabrication and nanoelectronics research.

Photolithography System

Introduction

Photolithography is a common tool used in microfabrication to transfer geometric patterns to a film or substrate. This technique combines photography and lithography to generate an image and can be utilized for a variety of applications. Photolithography uses ultra-violet (UV) light to transfer a geometric pattern from a photomask to a light-sensitive polymer, or photoresist, which hardens when exposed to UV light. A series of chemical treatments then either engraves the exposure pattern into the material or enables deposition of a new material in the desired pattern upon the material underneath the photoresist.

Application

- In a variety of industries including offset printing, screen printing, electronic board, circuit board, semiconductor, etc.
- In microfabrication to produce extremely small patterns.
- To create unique micro patterns for invention prototypes.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	MA5
Emission Spectrum	375 nm/ 420 nm
Illumination on the Surface	1 to 5 mW/cm^2
Mask & Sample Holding Mechanism	Using Vacuum
Microscope Stage	X: ± 100 mm Y: ± 80 mm Resolution: 0.5 µm Weight: 8.3 kg Power: 250 W
Mask Aligner	-
Mask Alignment Monitoring	Using Digital Microscope

About Company

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Nanotechnology in Product

Photolithography is a critical technology for nanoscale manufacturing, especially in the semiconductor industry.

Contact Lithography System

Introduction

Contact Lithography is a form of photolithography whereby the image to be printed is obtained by illumination of a photomask in direct contact with a substrate coated with an imaging photoresist layer. In this process, a solution of photoresist is deposited on the substrate by spin coating. The photoresist-coated substrate is then heated to drive off excess solvent. A mask with the desired pattern is then placed in contact with the substrate and both are exposed to intense UV light. A post-exposure bake is performed before immersing the substrate in a developer which removes excess photoresist. Positive photoresist becomes soluble in the developer when exposed; negative photoresist becomes insoluble in the developer. Finally, the substrate is baked again to solidify the remaining photoresist.

Application

Fabrication of optical devices, and micro-electromechanical systems (MEMS).

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	CL365
No. of UV Lamps	19
Emission Spectrum	365 nm/ 402 nm
Illumination on the Surface	1 to 5 mW/cm^2
Max. Light Intensity (Lumen)	15
Radation Power (W)	20
Power Supply	Single-phase, 220 V AC
Heating System Power (W)	200
Max. Baking Temperature (°C)	150
Dimensions (cm)	27×38×48
Weight (kg)	17.1

About Company

Name of company	Samane Tajhiz Danesh
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Nanotechnology in Product

Contact Lithography is devoted to the top-down patterning of materials covering from nanostructured surfaces to advanced micro-nano devices of interest.

Manufacturing Equipment

Other Equipment

- Electro-spark Deposition System
- Nano Colloid Maker
- Freeze Dryer System

Electro-spark Deposition System

Introduction

Electro-spark Deposition (ESD) is a micro welding process characterized by short duration high current pulses, often generated by capacitors, arcing between a conductive electrode and substrate. The high intensity, low net power process results in metallurgical bonded coatings or alloyed layers with practically no heat affected zone. The unique characteristics of this process facilitate the bonding of high ceramic content cermet materials, as well as heat sensitive high-value materials.

Application

- To repair components where low heat input, low distortion depositions are required.
- To apply coatings for the improvement of corrosion resistance, tribological properties and local alloy content.
- To produces amorphous or nanostructured coatings.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Power Supply	220 V, 50 Hz
Nominal Power (kW)	1
Frequency (Hz)	1 to 600
Work Period (%)	1 to 12

About Company

Name of company	Jahan Fanavar Pishro Ilia

Nanotechnology in Product

Electro-spark deposition process is a simple and cost-effective low-energy technique, in which short duration of the electrical pulse leads to extremely rapid melting and solidification of the electrode materials to form micro- or nanostructured coatings.

Nano Colloid Maker

Introduction

Nano Colloid Maker is a novel tool for the synthesis of nanopowders of metals, alloys, mixtures, and oxides. In this process a pulse of high-density current, which is commonly produced in the discharge of a capacitor bank, passes through a wire, and consequently the explosive disintegration of the metal happens, which is accompanied by a bright flash of light, a shockwave, the dispersion of the metal, and the fast expansion of a mixture of boiling metal droplets and vapor to the surrounding medium. Depending on the explosion conditions, particles with characteristic sizes of tens of micrometers to a few nanometers are formed.

Application

Synthesis of nanopowder of metals, alloys, mixtures, and oxides.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	PNC-1KD
Power Supply	220 V AC
Output Voltage	300-500 V DC
Max. Wire Dimensions (D×L) mm	0.2×20
Wire Material	Conductive Materials
Average Particle Size (nm)	10 to 50
Weight (kg)	50

About Company

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Nanotechnology in Product

Nano Colloid Maker is a novel tool for top-down production of nanopowder of all conductive metals, alloys, and oxides.

Freeze Dryer System

Introduction

Freeze Dyer is a water removal system typically used to preserve perishable materials, to extend shelf-life or make the material more convenient for transport. Freeze dryer works by freezing the material, then reducing the pressure and adding heat to allow the frozen water in the material to sublimate. This is in contrast to dehydration by most conventional methods which use hot air to evaporate water and lead to dryness. Because of using low temperature in freeze drying, the original shape of the product is maintained and quality is excellent.

Application

- Increasing shelf-life of drugs and vaccines in pharmaceuticals.
- In food processing to extend the shelf-life of the food while maintaining the quality.
- Stabilization and/or storage of biological materials for research and development.
- Sample preparation for chemical or biochemical analysis.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	FD-4	FD-10V	FD-10H
No. of Shelves	-	3	3
Total Product Shelf Area (cm2)	-	960	3000
Condenser Capacity (kg)	4	10	10
Condenser Ultimate Temperature (°C)	-50	-65	-65
Dimensions (cm)	78×62×81	100×80×115	90×80×115
Weight (kg)	68	130	300
Chamber Position	Vertical	Vertical	Horizontal
Condenser Chamber Material	Stainless Steel 316L		
Drying Chamber Material	Stainless Steel 316L		
Power Supply	220 V, 50 Hz		
Vacuum Gauge	Pirani Gauge (with 0.001 mbar accuracy)		
Control Panel	PLC+HMI		

About Company

Name of company	Pishtaz Engineering Co.
Website	www.tspinstruments.com
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Nanotechnology in Product

Freeze Dryer is considered as an efficient tool to improve the end-used properties and long-term stability of colloidal nanoparticles. It has also found application in the production of nanoparticles for electrochemical, engineered materials, and pharmaceutical industries.

Analytical Instruments

- Scanning Probe Microscopes
- Spectrophotometers
- Spectrometers
- Separators and Chromatographs
- Characterization Analyzers
- In Vivo Imaging Systems
- Profilometers and Thickness Measurement Tools
- Other Equipment


NANO-SPM


EMERALD


HiReSPECT

Analytical Instruments

Scanning Probe Microscopes

- Atomic Force Microscope (AFM)
- Educational Scanning Probe Microscope
- Educational Scanning Tunneling Microscope (STM)
- Scanning Probe Microscope (SPM)
- Scanning Tunneling Microscope (STM)

Atomic Force Microscope (AFM)

Introduction

Atomic Force Microscope is one of the most important tools for imaging on the nanometer scale. In this Atomic Force Microscopy, a sharp probe is brought into close proximity with the sample to be analyzed. Probe and sample are then moved relative to each other in a raster pattern, and a quantity is measured in a serial fashion at discreet locations. The interactions between the tip and sample surface are measured by monitoring the displacement of the free end of the attached cantilever. The cantilever provides a force sensor and a force actuator. By pushing the cantilever to the sample, its topographic height can be measured, and the interacting force between the tip attached to the cantilever and the sample can be measured by pulling it.

Application

- Measuring the thickness of deposited thin films, as well as the height of the features on patterned wafers.
- Surface roughness measurement.
- Manipulation, nanolithography and etching of the surface on an atomic scale.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	NAMA AFM
X-Y Scan Range (×m)	10
Z Scan Range (×m)	3
Lateral Resolution (nm)	0.13
Vertical Resolution (nm)	0.05
Max. Sample Size (mm)	20
XY Micro Positioning Stage (µm)	2.5
Scanner DAC/ADC Resolution	16 bit
Scanning Pattern	Movable sample relative to the fixed probe
Scanner	Piezo ceramic
Standard Modes	Contact Mode; Non-contact Mode, Tapping Mode

About Company

Name of company	Nanotechnology System Corporation (NATSYCO)
Website	www.natsyco.com
Email	info@natsyco.com

Nanotechnology in Product

Atomic Force Microscope is a type of high-resolution scanning probe microscope that has a resolution that you can measure in fractions of a nanometer.

Educational Scanning Probe Microscope

Introduction

Educational Scanning Probe Microscope covers several related technologies for imaging and measuring surfaces on a fine scale, down to the level of molecules and groups of atoms. SPM technology shares the concept of scanning an extremely sharp tip (3-50 nm radius of curvature) across the object surface. The tip is mounted on a flexible cantilever, allowing the tip to follow the surface profile. When the tip moves in proximity to the investigated object, forces of interaction between the tip and the surface influence the movement of the cantilever. These movements are detected by selective sensors. Various interactions can be studied depending on the mechanics of the probe

Application

- Surface roughness measurement.
- Manipulation, nanolithography and etching of the surface on an atomic scale.
- Measuring the thickness of deposited thin films, as well as the height of the features on patterned wafers.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	SPM-EDU
X-Y Scan Range (×m)	80
Z Scan Range (×m)	4
Lateral Resolution (nm)	1
Vertical Resolution (nm)	1
Max. X-Y Line Scan Frequency (Hz)	20
Sample Bias Voltage (V)	± 10 for STM mode
Sample Bias Accuracy (mV)	0.3
Current Set Point (nA)	± 100
Current Set Point Accuracy (pA)	3
Normal Modes	1; 10; 100; 500; 1000; 2000
Max. X-Y Step Frequency (Hz)	100
Scan Rate (line/s)	Max. 20

About Company

Name of company	Nanotechnology System Corporation (NATSYCO)
Website	www.natsyco.com
Email	info@natsyco.com

Nanotechnology in Product

Educational Scanning Probe Microscope is an efficient tool to create images of nanoscale surfaces and structures or manipulate atoms to move them in specific patterns.

Educational Scanning Tunneling Microscope (STM)

Introduction

Educational Scanning Tunneling Microscope is an educational instrument to explore in the nanoscience. STM is a non-optical microscope that works by scanning an electrical probe tip over the surface of a sample at a constant spacing. This allows for a 3D picture of the surface to be created. The STM uses a tip that ends in a single atom and a voltage is passed though, the tip and the sample. Electrons use a quantum mechanical effect to 'tunnel' from the tip to the sample or vice versa. The current that results depends upon the distance between the probe tip and the sample surface. The tip is attached to a piezoelectric tube and voltage applied to the piezo rod is altered to maintain a constant distance for the tip from the surface. Changes in this voltage allow a 3D picture of the material surface to be built up as the tip is scanned back and forth across the sample.

Application

- Arrangement of individual atoms on the metal surfaces.
- To study friction, surface roughness, defects and surface reactions in materials like catalysts.

- Manipulation, nanolithography and etching of the surface on an atomic scale.
- In research surrounding semiconductors and microelectronics.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	NAMA STM-EDU
Electronics Size (cm)	45×35×18
Power Supply	220 V, 50 Hz, 1 A
Scan Speed	Up to 100 Line/s at 128 data point / line
Scan Image Rotation (degree)	0-360
X-Y Scan Range (µm)	1±0.5
Z Scan Range (µm)	1±0.5
Vertical Resolution (nm)	0.015
Lateral Resolution (nm)	0.015
Current Set Point (nA)	0.02-100
Current Set Point Accuracy (pA)	3
Imaging Mode	Constant Current/ Constant Height
Tip Voltage (V)	±10 (with 0.3 mV increment)
Tip Displacing Mechanism	Fully automatic or Manually (software control)
Sample Size Diameter (mm)	Max. 20
Noise Reduction and Feature Enhancement	Data filtering in three levels

About Company

Name of company	Nanotechnology System Corporation (NATSYCO)
Website	www.natsyco.com
Email	info@natsyco.com

Nanotechnology in Product

Educational Scanning Tunneling Microscope is an efficient tool to create images of nano-scale surfaces and structures or manipulate atoms to move them in specific patterns.

Scanning Probe Microscope (SPM)

Introduction

Scanning Probe Microscope (SPM) is used to create images of the sample surface at the nanoscale level or manipulate atoms to form specific patterns. An SPM has a probe tip mounted on the end of the cantilever. The tip is as sharp as a single atom and can move precisely and accurately back and forth across the surface, even atom by atom. When the tip is near the sample surface, the cantilever is deflected by a force. SPMs can measure deflections caused by many kinds of forces, including mechanical contact, electrostatic forces, magnetic forces, chemical bonding, van der Waals forces, and capillary forces. The distance of the deflection is measured by a laser that is reflected off the top of the cantilever and into an array of photodiodes.

Application

- Surface roughness measurement.
- Manipulation, nanolithography and etching of the surface on an atomic scale.
- Measuring the thickness of deposited thin films, as well as the height of the features on patterned wafers.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	AFM-STM All In One
X-Y Scan Range (×m)	10
Z Scan Range (×m)	3
Lateral Resolution (nm)	0.13
Vertical Resolution (nm)	0.05
Max. Sample Size (mm)	20
XY Micro Positioning Stage (µm)	2.5
Scanner DAC/ADC Resolution	16 bit
Scanning Pattern	Movable sample relative to the fixed probe
Scanner	Piezo ceramic
Standard Modes	Contact Mode; Non-contact Mode, Tapping Mode

About Company

Name of company	Nanotechnology System Corporation (NATSYCO)
Website	www.natsyco.com
Email	info@natsyco.com

Nanotechnology in Product

Scanning Probe Microscope is an efficient tool to create images of the sample surface at the nanoscale level or manipulate atoms to form specific patterns.

Scanning Tunneling Microscope (STM)

Introduction

Scanning Tunneling Microscope (STM) is a type of electron microscope that shows 3D images of a sample. In the STM, the structure of a surface is studied using a stylus that scans the surface at a fixed distance from it. An extremely fine conducting probe is held close to the sample. Electrons tunnel between the surface and the stylus, producing an electrical signal. The stylus is extremely sharp, the tip being formed by one single atom. It slowly scans across the surface at a distance of only an atom's diameter. The stylus is raised and lowered in order to keep the signal constant and maintain the distance. This enables it to follow even the smallest details of the surface it is scanning. Recording the vertical movement of the stylus makes it possible to study the structure of the surface atom by atom.

Application

- Arrangement of individual atoms on the metal surfaces.
- To study friction, surface roughness, defects and surface reactions in materials like catalysts.
- Manipulation, nanolithography and etching of the surface on an atomic scale.
- In research surrounding semiconductors and microelectronics.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	SS3
Electronics Size (cm)	45×35×18
Full Scale Corresponds to	+100 V, for 8 ×m×8×m scan range
Power Supply	220 V, 50/60 Hz, 0.7 A
Max. Equivalent Intrinsic Current Noise	10PARMS
Sample Bias Voltage (V)	±10 (with 0.3 mV increment)
Current Set Point (nA)	±100 (with 3 pA increment)
Imaging Mode	Constant Current/ Constant Height
Tip Voltage (V)	±10
Tip Displacing Mechanism	Fully automatic or Manually (software control)
Sample Size Diameter (mm)	Max. 20
Online Processing Functions	Derived data, Current set point, Sample bias, PID frequency, ...
Quick Evaluation Functions	Distance, Cross-section, Roughness, ...
Data Export	BMP

About Company

Name of company	Nanotechnology System Corporation (NATSYCO)
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Nanotechnology in Product

Scanning Tunneling Microscope is an efficient tool to create images of the sample surface at the nanoscale level or manipulate atoms to from specific patterns.

Analytical Instruments

Spectrophotometers

- Miniature UV-VIS-NIR Spectrometer
- Miniature UV-VIS-NIR Spectrometer
- Nano Spectrophotometer
- UV-VIS Array Spectrophotometer

Miniature UV-VIS-NIR Spectrometer

Introduction

Miniature Spectrometer is a portable analytical instrument used to quantify the light that is absorbed and scattered by a sample (a quantity known as the extinction, which is defined as the sum of absorbed and scattered light). In its simplest form, a sample is placed between a light source and a photodetector, and the intensity of a beam of light is measured before and after passing through the sample. These measurements are compared at each wavelength to quantify the sample's wavelength dependent extinction spectrum. The data is typically plotted as extinction as a function of wavelength. Each spectrum is background corrected using a cuvette filled with only the dispersing medium to guarantee that spectral features from the solvent are not included in the sample extinction spectrum.

Application

- Quantitative analysis of different analytes such as transition metal ions, conjugated organic compounds, etc.
- Characterizing the optical and electronic properties of various materials such as films, powders, monolithic solids, liquids and gases.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	UVS-2500		
Wavelength Range (nm)	190-850		
Slit Size Options (µm)	17	25	50
Resolution According to Slit (nm)	1.2	1.35	2
Wavelength Accuracy (nm)	0.1		
Stray Light	0.04-0.1% in Absorption		
Signal to Noise	700: 1		
Integration Time	1 ×s to 33 s		
No. of Scan to Average	0-99 Scan		
Detector	CCD, 2048 or 3648 pixels		
Light Source	Deuterium: 190-450 nm/ Halogen Tungsten: 350-1100 nm Combo: Deuterium+ Halogen Tungsten		
Data Transfer Speed (ms/scan)	3.7 (USB2.0)		
USB Interface	2.0 High Speed, 480 Mbps		
Operating Systems	Win XP, Vista, 7 and 8		
Power Supply	Default USB Power		
Processing Media	Solid, Liquid and Gas		
Dimensions (cm)	15×20×7		
Weight (gr)	700		

About Company

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Nanotechnology in Product

Nanoparticles have optical properties that are sensitive to size, shape, concentration, agglomeration state, and refractive index near the nanoparticle surface, which makes Miniature UV-VIS-NIR Spectrometer a valuable tool for identifying and characterizing these materials.

Miniature UV-VIS-NIR Spectrometer

Introduction

Miniature UV-VIS-NIR Spectrometer is an analytical instrument that measures transmission, reflection, and absorption spectra in the ultra-violet, visible and near infrared regions. In this tool, a sample is placed between a light source and a photodetector, and the intensity of a beam of light is measured before and after passing through the sample. These measurements are compared at each wavelength to quantify the sample's wavelength dependent extinction spectrum. The data is typically plotted as extinction as a function of wavelength. Each spectrum is background corrected using a cuvette filled with only the dispersing medium to guarantee that spectral features from the solvent are not included in the sample extinction spectrum.

Application

- Quantitative analysis of different analytes such as transition metal ions, conjugated organic compounds, etc.
- Characterizing the optical and electronic properties of various materials such as films, powders, monolithic solids, liquids and gases.

Certificates and standards

- Certificate of Nanotechnology

The Miniature UV-VIS-NIR Spectrometers provided by this company are designed and produced in two different models.

Technical specifications

Device Models	C0R10	C25R10
Spectral Range	200-900 nm	
Spectral Resolution	1.3 nm	
Detector	CCD Liner Array, 2048 pixels	CCD Liner Array, 3648 pixels
Grating (line/mm)	1200	300
Cooling Temperature (°C)	-	Thermoelectric Cooling to 0
Spectrometer Type	Czerny-Turner	
Slit Size (µm)	25	
Spectral Accuracy (nm)	0.1	
Data Transfer Speed (ms/scan)	15	
Integration Time	15 ms to 10 min	
Interface	USB 1.1, 2.0	
Dimensions (cm)	21×11×19	
Weight (kg)	5	

About Company

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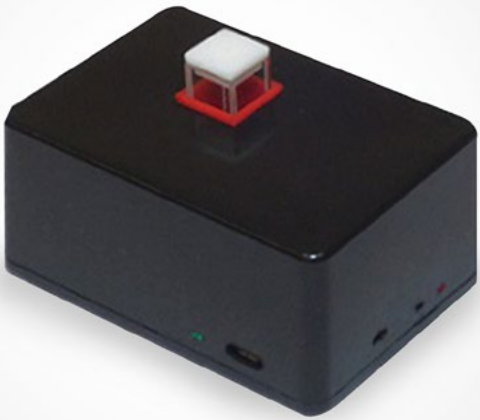
Nanotechnology in Product

Nanoparticles have optical properties that are sensitive to size, shape, concentration, agglomeration state, and refractive index near the nanoparticle surface, which makes Miniature UV-VIS-NIR Spectrometer a valuable tool for identifying and characterizing these materials.



Nano Spectrophotometer

Introduction

Nano Spectrophotometer is a very small spectrophotometer which can be used to estimate the level of an analyte in a solution. The basic principle is that each compound absorbs or transmits light over a certain range of wavelength as it passes through the solution. This portable instrument consists of four main parts including light source, polychromator, array detector and sample cell. Usually an incandescent with LED support is used as light source to produce visible light with wavelengths in the range of 340-880 nm. During analysis, incident light interacts with sample and transmits through it; then light passes through the slit and finally reaches to a monochromator for detection. After analyzing the wavelengths of light, the absorption is measured by the software and the spectrum is drawn.

Application

Analysis of chemicals, biochemical, nanomaterials, pharmaceuticals, petroleum, minerals, etc.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	NanoSpectro Pro
Wavelength Range (nm)	340-880
Wavelength Reporting Interval (nm)	< 2
Optical Resolution (FWHM) nm	< 5
Wavelength Accuracy (nm)	< ± 0.1 (at 650 nm)
Wavelength Reproducibility (nm)	< ± 0.02 for 10 consecutive scans (NIST 2034)
Photometric Accuracy (%)	± 8.0
Integration Time	< 54 ×s - 2000 ms
Typical Scan Time (s)	0.1
Light Source	Incandescent with LED support
Detector	Array Multichannel
A/D Conversion (bit)	14
Wireless Communication Range (m)	Up to 10
Operating Temperature (°C)	5 to 50
Dimensions (L×W×H) mm	56×85×39
Storage Temperature (°C)	-20 to 70

About Company

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Nanotechnology in Product

Nanoparticles have optical properties that are sensitive to size, shape, concentration, agglomeration state, and refractive index near the nanoparticle surface that makes Nano Spectrophotometer a valuable tool for identifying and characterizing these materials.

UV-VIS
Array Spectrophotometer

Introduction

UV-VIS Array Spectrophotometer is a routinely used instrument in scientific research. It measures light intensity in the UV and visible regions of the electromagnetic spectrum as a function of wavelength and is commonly used to measure the concentration of a compound in an aqueous solution. According to the Beer Lambert's Law, when a monochromatic light passes through an absorbing medium, the amount of light that is absorbed is directly proportional to the number of light absorbing molecules in that medium or the concentration of substance in that medium.

Application

- Determining concentration, enzymes activity, triglycerides, cholesterol, lipoproteins, glucose, creatinine, urea, etc.
- Measuring concentration of protein, DNA and a wide range of analytes with clinical and research applications.
- Measuring a wide range of drugs and metabolites.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	Ar5 & Ar 2017	Ar5v & Ar 2017	Abs-Ar-2015	Nanodrop
Model Description	UV-Vis Spect.	Vis. Spect.	Absorption Spect.	UV-Vis Spect.
Light Source	Deuterium+Halogen/ Tungsten	Tungsten lamp	Deuterium+Halogen/ Tungsten	Deuterium+Halogen/ Tungsten
Wavelength Range (nm)	200-800	380-800	200-800	200-800
Detector	2000 Multi-channel	1000 Multi-channel	2000 Multi-channel	2000 Multi-channel
Typical Scan Time (s)	0.05	0.05	0.1	0.1
Dimensions (L×W×H) cm	55×37×15			50×33×13
Sample Volume (nL)	-			700-4000 or 3000-4000
Light Path (mm)	-			0.2 or 1
Straylight (%)	< 0.03			
Resolution (nm)	< +1.0			
Wavelength Accuracy (nm)	< ± 0.1			
Wavelength Reproducibility	< ± 0.02 nm for 10 consecutive scans (NIST 2034)			
Photometric Accuracy	Nanodrop Spectrophotometer: < ± 0.01 Absorption at 235, 257, 313 nm Other Models: < ± 0.01 Absorption at 440, 465, 590, 635 nm			
Photometric Noise	< 0.01 Absorption 80 scan at 0 A, 500 nm			
Photometric Stability (A/min)	< 0.01 at 0 Absorption, 500 nm			
Baseline Flatness	< 0.01 Absorption 0.5 second blank, 0.5 second scan at 0 Absorption, 500 nm			
Scan Time (ms)	2-1000			
Input Power	Single-phase, 220 V AC 50-60 Hz			
Weight (kg)	10			

About Company

Name of company	Teifsanje Tajhiz Pishrafteh Co.
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Nanotechnology in Product

Nanoparticles have optical properties that are sensitive to size, shape, concentration, agglomeration state, and refractive index near the nanoparticle surface, which makes UV-VIS Spectrophotometer a valuable tool for identifying and characterizing these materials.

Analytical Instruments

Spectrometers

- Localized Surface Plasmon Resonance (LSPR) Spectrometer
- Portable Raman Spectrometer
- Raman Microscope
- Fluorescence Spectrometer
- Raman Spectrometer

Localized Surface Plasmon Resonance (LSPR) Spectrometer

Introduction

LSPR Spectrometer works based on a type of spectroscopy where the resonant excitation of surface plasmons (usually on a noble metal nanoparticles surface) by ultraviolet or visible light is measured. In this method, nanostructures form the sensitive sensor surface where localized surface plasmons are excited using polarized or unpolarized light emitted by a light source. The light is transmitted through the nanostructures, where it can couple to the surface mode and yield localized surface plasmons. Excitation of localized plasmons is evidenced by a resonant maximum in the extinction spectrum. The wavelength dependence of this extinction intensity (the LSPR spectrum) reflects variation of the LSPR coupling level and represents the sensor output.

Application

- Identifying chemicals, biomolecules and gases with high accuracy at low concentration.
- Detection of weak reactions between biomolecules.
- Simultaneous detection of different biological agents.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	LSPR NMBCLSPR920225
Biochip	25 Independent Channels or Pixels
Sample Volume (×L)	5 to15 for each Channel
Detection Limit	Nanomolar to Femtomolar (Depends on bacterium or virus type)
Working Temperature	Ambient
Light Source Wavelength Range (nm)	350-2300
Detector Wavelength Range (nm)	200-1100
Wavelength Resolution	0.5
Noise	0.5
Data Monitoring	Auto-tracking of Plasmon Peak
Dimensions (cm)	22.5×40×30
Other Features	Real-time, Portable, Label-free, Specific detection

About Company

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Nanotechnology in Product

LSPR Spectrometer implements the measurements of noble metal nanoparticles extinction. These nanostructures form a sensitive sensor surface which can be used for detection of chemicals, biomolecules and gases.

Portable Raman Spectrometer

Introduction

Portable Raman Spectrometer is a hand-held tool used to identify or verify the components of a sample. In order to analyze, a sample is normally illuminated with a laser beam in the ultraviolet (UV), visible (Vis) or near infrared (NIR) range. Scattered light is collected with a lens and is sent through interference filter or spectrophotometer to obtain Raman spectrum of a sample. Therefore, the principle is based on light interacting with the chemical bonds of a sample. Due to vibrations in the chemical bonds, the interaction with photons causes specific energy shifts in the backscattered light that appear in a Raman spectrum. The Raman spectrum is unique for each chemical composition and can provide qualitative and quantitative information of the material.

Application

- Tracking changes in molecular structures.
- Identifying an unknown substance.
- Tracking a change in crystallinity.
- Analysis of a wide range of nanomaterials.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	Portino 502510
Spectrometer Type	Czerny-Turner
Spectral Range (cm-1)	200-3300
Spectral Resolution (cm-1)	10
Excitation Source	DPSS Nd:YAG Laser
Laser Power (mW)	Adjustable up to 100
Laser Wavelength (nm)	532±1
Detector	CCD Liner Array, 2048 pixels
Slit Size (µm)	25
Grating (line/mm)	1200
Cooling Temperature (°C)	Thermoelectric Cooling to 0
Integration Time	15 ms to 10 min
Data Transfer Speed (ms/scan)	15
Interface	USB 1.1, 2.0
Dimensions (cm)	40×40×40
Weight (kg)	20

About Company

Name of company	Takfamsazan Teif-e Noor
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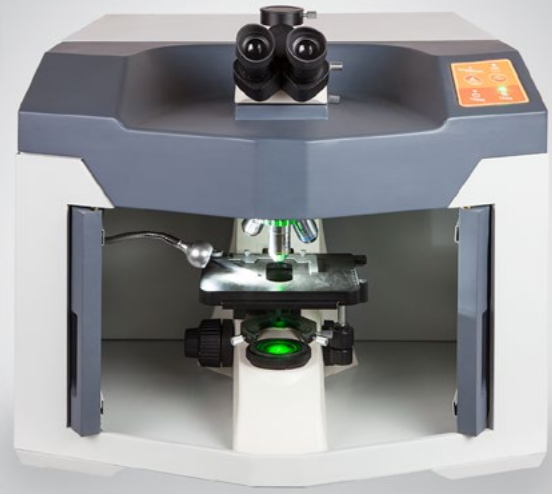
Nanotechnology in Product

Nanoparticles have optical properties that are sensitive to size, shape, concentration, agglomeration state, and refractive index near the nanoparticle surface, which makes Portable Raman Spectrometer a valuable tool for identifying and characterizing these materials.



Raman Microscope

Introduction

Raman microscopy couples a Raman spectrometer to a standard optical microscope, allowing high magnification visualization of a sample and Raman analysis with a microscopic laser spot. This analytical technique relies on inelastic scattering of monochromatic light, usually from a laser in the visible, near infrared, or near ultraviolet range. Typically, a sample is illuminated with a laser beam. Electromagnetic radiation from the illuminated spot is collected with a lens and sent through a monochromator. Elastic scattered radiation at the wavelength corresponding to the laser line (Rayleigh scattering) is filtered out while the rest of the collected light is dispersed onto a detector.

Application

- To identify molecules and study chemical bonding.
- Characterization of materials such as polymers and pharmaceuticals.
- Analysis of a wide range of nanomaterials such as nanotubes, graphene.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	N1541	P50C40R10
Spectral Range	200-900 nm	
Spectral Resolution	1.3 nm	
Detector	CCD Liner Array, 3648 pixels	CCD Liner Array, 2048 pixels
Dimensions (cm)	60×50×50	40×70×50
Spectrometer Type	Czerny-Turner	
Excitation Source	DPSS Nd:YAG Laser	
Laser Power (mW)	Adjustable up to 100	
Laser Wavelength (nm)	532±1	
Slit Size (µm)	25	
Spectrometer/ Microscope Switch	Automatic	
Grating (line/mm)	1200	
Cooling Temperature (°C)	Thermoelectric Cooling to -15	
Integration Time	15 ms to 10 min	
Data Transfer Speed (ms/scan)	15	
Interface	USB 1.1, 2.0	
Weight (kg)	60	

About Company

Name of company	Takfamsazan Teif-e Noor
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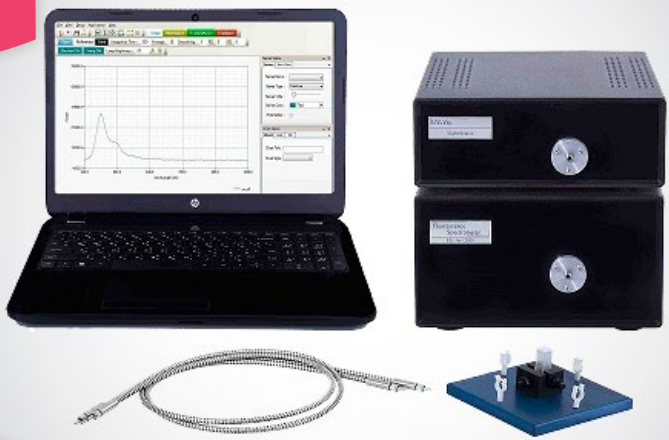
Email	info@teksan.ir

Nanotechnology in Product

Raman offers a diffraction limited spatial resolution in the order of a few hundreds of nanometers. Despite the difference between this resolution and the actual dimensions of the nanomaterials, Raman remains an excellent tool to answer many questions about their structure and properties.



Fluorescence Spectrometer

Introduction

Fluorescence Spectrometer is a fast, simple and inexpensive method to determine the concentration of an analyte in solution based on its fluorescent properties. In this technique, a light of a specific wavelength band is passed through a solution (in case of using laser as a radiation source, the device is called Laser Induced Fluorescence Spectrometer), which emits the light towards a filter and into a detector for measurement. The amount of light that is absorbed by the sample (excitation spectrum) and the amount of light that is emitted by the sample (emission spectrum) can be quantified. The concentration levels of the analyte compound within the solution can be determined as these levels are directly proportional to the emission spectrum.

Application

- Quantitative analysis of small amounts of many organic and inorganic compounds.
- Measuring species concentrations and energy-level population distributions.
- Probing energy transfer processes in molecules and atoms.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

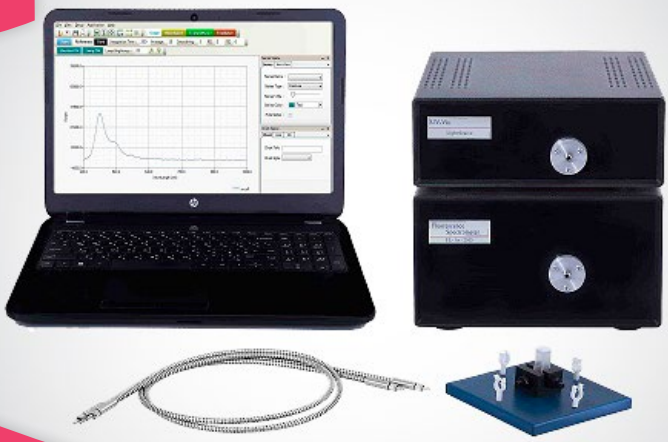
Device Models	FL-Ar-2015	LIF-Ar-2015
Light Source	Deuterium+Halogen / Tungsten	Laser 405, 532 nm
Model Description	Fluorescence Spectrometer	Laser Induced Fluorescence Spectrometer
Photometric Accuracy	< ± 0.01 Absorption at 440, 465, 590, 635 nm (NIST 930e)	< ± 0.01 Absorption at 590, 635 nm (NIST 930e)
Wavelength Range (nm)	380-800	
Straylight (%)	< 0.03	
Resolution (nm)	< +1.0	
Wavelength Accuracy (nm)	< ± 0.1	
Wavelength Reproducibility	< ± 0.02 nm for 10 consecutive scans (NIST 2034)	
Photometric Noise	< 0.01 Absorption 80 scan at 0 A, 500 nm	
Photometric Stability	< 0.01 A/min at 0 Absorption , 500 nm	
Baseline Flatness	< 0.01 Absorption 0.5 second blank, 0.5 second scan at 0 Absorption, 500 nm	
Scan Time (ms)	2-1000	
Typical Scan Time (s)	0.1	
Detector	1000 Multichannel	
Dimensions (Spectrometer) cm	13×22×28	
Dimensions (Light Source) cm	8×22×28	
Weight (kg)	8	
Input Power	Single-phase, 220 V AC 50-60 Hz	

About Company

Name of company	Teifsanje Tajhiz Pishrafteh Co.
Website	www.teifsanje.ir
Email	info@teifsanje.ir

Nanotechnology in Product

Nanoparticles have optical properties that are sensitive to size, shape, concentration, agglomeration state, and refractive index near the nanoparticle surface, which makes Fluorescence Spectrometer a valuable tool for identifying and characterizing these materials.



Raman Spectrometer

Introduction

Raman Spectrometer is an optical instrument that detects intrinsic vibrational, rotational and other low-frequency modes in molecules upon inelastic scattering of monochromatic light. This technique uses a laser light source to irradiate a sample, and generates an infinitesimal amount of Raman scattered light, which is detected as a Raman spectrum. The characteristic fingerprinting pattern in a Raman spectrum makes it possible to identify substances including polymorphs and evaluate local crystallinity, orientation and stress.

Application

- Identifying an unknown substance.
- Identifying polymorphs.
- Tracking changes in molecular structures.
- Tracking a change in crystallinity.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Wavelength Range (cm-1)	150- 4500
Stray Light (%)	< 0.03
Resolution (cm-1)	< + 20
Signal to Noise Ratio	1000:1 (at full signal)
Photometric Accuracy (nm)	< ± 1
Wavelength Reproducibility (nm)	< ± 0.02 for 10 consecutive scans (NIST 2034)
Baseline Flatness	< 0.01 Absorption 0.5 second blank, 0.5 second scan at 0 Absorption, 500 nm
Scan Time (ms)	2-2000
Typical Scan Time (s)	0.1
Detector	1000 channels
Laser Wavelength (nm)	532±1
Output Power (mW)	300
Power Stability	<1% rms. Over 4 hours
Expected Lifetime (h)	10000
Dimension (Spectrometer) cm	13×22×28
Dimension (Light Source) cm	8×22×28
Weight (kg)	8
Input Power	Single-phase, 220 V AC 50-60 Hz

About Company

Name of company	Teifsanje Tajhiz Pishrafteh Co.
Website	www.teifsanje.ir
Email	info@teifsanje.ir

Nanotechnology in Product

Nanoparticles have optical properties that are sensitive to size, shape, concentration, agglomeration state, and refractive index near the nanoparticle surface, which makes Raman Spectrometer a valuable tool for identifying and characterizing these materials.

Analytical Instruments

Separators and Chromatographs

- Capillary Electrophoresis System
- Ion Mobility Spectrometer
- Ion Mobilityn Spectrometer
- Gas Chromatograph (GC)

Fanavaran Nano Meghyas

Capillary Electrophoresis System

Introduction

This Capillary Electrophoresis System is an automated, programmable tool that separates ions based on their electrophoretic mobility with the use of an applied voltage. In this tool, a capillary is filled with a conductive fluid at a certain pH value (buffer solution). A sample is introduced in the capillary, either by pressure injection or by electrokinetic injection. A high voltage is generated over the capillary and due to this electric field, the sample components move through the capillary at different speeds. There is usually a small window near the cathodic end of the capillary which allows UV-VIS light to pass through the analyte and measure the absorbance. A photomultiplier tube is also connected at the cathodic end of the capillary, which enables the construction of a mass spectrum, providing information about the mass to charge ratio of the ionic species.

Application

- DNA and protein analysis.
- Forensics analysis.
- Molecular diagnostics.
- Genetic testing.
- Microbial identification.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	CE1000
High Voltage Power Supply	+20 kV Programmable Power Supply -20 kV (Optional)
Injection Mode	Pressure Injection: 20 to 100 mbar Electrokinetic Injection: 1 to 5 kV
Pressure System	Programmable from 20 to 100 mbar for injection, washing and flushing
Autosampler	A 16-position Carousel
Injection Tool	Sample Vial Volume: 100 ×L Buffer Vial Volume: 1-2 mL
Temperature control	Capillary is housed in an cartridge for temperature control and easy substitution
Light Source	Deuterium+ Halogen Lamp
Detector	Detection at UV-VIS Range (200-900 nm)
Software Features	Real time electropherogram visualization Electropherogram data processing Computation of electrophoresis system parameters
Dimensions (cm)	55×45×45
Weight (kg)	45

About Company

Name of company	Fanavaran Nano Meghyas
Website	www.fnm.ir
Email	info@fnm.ir

Nanotechnology in Product

Capillary Electrophoresis System is a powerful analytical instrument which can be used for characterization of nanomaterials.

Ion Mobility Spectrometer

Introduction

Ion Mobility Spectrometer (IMS) is a device for fast and very sensitive trace gas analysis. The separation of the ions is based on a simple concept - ions with different sizes and shapes (and different charge states too) will travel at different velocities. In this instrument, ions are accelerated along a drift tube operating with an applied electric field and a buffer gas flow opposing the ion motion. Ions with different size and shape will have different ion mobilities and therefore different drift times before the detector is reached.

Application

- Chemical weapons monitoring and detection of explosives.
- Analysis of air and food quality.
- Medical diagnostics.
- Biological and clinical analysis.
- Drug detection.
- Forensic examination.

Certificates and standards

- Certificate of Nanotechnology

The Ion Mobility Spectrometers provided by this company are designed and produced in two different models.

Technical specifications

Device Models	IMS-300	IMS-400
Ionization Source	Corona Discharge	Corona Discharge, Thermal or UV Ionization
Reduced Mobility Range	0.1-10	
Processing Sample Type	Solid, Liquid, Gas	
Detection Limits	ppb	
Device Polarity	Positive & Negative	
Total Length of Cell (mm)	160	
Length of Ionization Region (mm)	53	
Length of Drift Region (mm)	107	
Drift Field Voltage (V)	Adjustable up to 7000	
Current (×A)	200	
Temperature Range (°C)	25 to 200	
Process Gas	Air, Nitrogen and Oxygen	
Gas Velocity (ml/min)	0 to1000	
Weight (kg)	30	
Dimensions (cm)	30×36×45	

About Company

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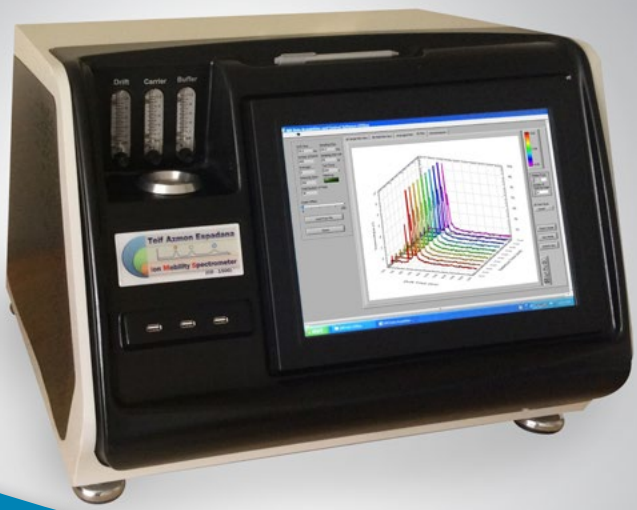
Nanotechnology in Product

Ion Mobility Spectrometer is a fast and very sensitive trace gas analysis tool which can be used to characterize nanomaterials.



Ion Mobility Spectrometer

Introduction

Ion Mobility Spectrometer (IMS) is a widely used analytical tool for the separation and detection of gas phase ions in a weak electric filed based on the differences in ion mobility at the atmospheric pressure. In this tool, the drift tube is filled with an inert buffer gas (i.e. argon, helium, and nitrogen) at atmospheric pressure conditions. Ions move according to diffusion processes through the drift tube as the energies of the ions are similar to the thermal energy of the buffer gas. Various ions will have different mobilities in a given drift tube device which allows the separation of mixtures of ions and structural information to be obtained.

Application

- Analysis of solids and surfaces.
- Chemical analysis.
- Environmental monitoring.
- Product quality control in industry.
- Explosives detection.
- Drug quality control.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	CD-1400	CD-1500
Control Panel	-	Multi-color Touch Screen
Ionization Source	Corona Discharge	
Signal to Noise	600	
High Voltage Power Supply	Non-Isolated 10 kV Isolated 5 kV	
Pulse Generator	30 to 400 ×s with Adjustable Voltage from 0 to 420 V	
Power (W)	900	
Signal Amplifier (V/A)	109	
Processing Sample Type	Solid, Liquid, Gas	
Device Polarity	Positive & Negative	
Oven Temperature (°C)	Up to 200	
Process Time (s)	3-5	
Weight (kg)	30	
Dimensions (cm)	60×50×50	

About Company

Name of company	Teif Azmoon Spadana
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Email	info@teifazmon.com

Nanotechnology in Product

Ion Mobility Spectrometer is a fast and very sensitive trace gas analysis tool which can be used to characterize nanomaterials.

Gas Chromatograph (GC)

Introduction

Gas Chromatograph (GC) is an analytical instrument that measures the content of various components in a sample. In gas chromatography, the sample solution injected into the instrument, enters a gas stream which transports the sample into a separation tube known as the column. The various components are separated inside the column. The detector measures the quantity of the components that exit the column. To measure a sample with an unknown concentration, a standard sample with a known concentration is injected into the instrument. The standard sample peak retention time (appearance time) and area are compared to the test sample to calculate the concentration.

Application

- Petrol and Petrochemical.
- Pharmacology.
- Environmental protection.
- Chemistry laboratories.
- Scientific research.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	GC-2552
Oven Temperature (°C)	Ambient ~ 400 (PID control)
Injection-Detection Temperature (°C)	Ambient ~ 400 (PID control)
Injector	Capillary-Packed (2 Ports)
Capillary Mode	Split/ Splitless
Injection Mode	Manual/ Online (by multi-port valve)
Multiple Injection	Online by 10 Ports Valve
Detector	FID, TCD, HID
FID Detector	High Speed (Up to 300 Hz)
FID Dynamic Range	107
FID Detection Limit (g/s)	3×10^{-12}
TCD Detector	High Speed (Up to 300 Hz)
TCD Filament	4 Filament (Rhenium-Tungsten)
Gas Control	Electronic Pneumatic Control (EPC)
Power Supply	220 V AC, 50-60 Hz, 2.5 kW
Dimensions (cm)	54×45×50
Weight (kg)	50

About Company

Name of company	Teif Gostar Faraz Co.
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Email	info@irangc.com

Nanotechnology in Product

Gas Chromatograph is an efficient and common tool in analytical chemistry for separating and analyzing of compounds that can be vaporized without decomposition.

Analytical Instruments

Characterization Analyzers

- Magnetometer
- Differential Scanning Calorimeter (DSC)
- NanoSORD
- Gas Sensor and Catalyst Integrated Testing System
- Membrane Gas Separation and Permporometry System (MGSPS)

Magnetometer

Introduction

Magnetometer is a powerful system for measuring the magnetic properties of a vast range of materials. This instrument is an integrated VSM/AGFM Magnetometer. In VSM technique, a sample to be studied is placed inside the uniform magnetic field and then vibrated sinusoidally using a vibrator, while in Alternative Gradient Field Magnetometer (AGFM) technique, a magnetic field gradient is used for creating and applying an alternating force on a sample. The sample firmly placed on a stage, begins to vibrate in accordance with the magnetic field frequency. These vibrations are sensed by the stage, recorded with the aid of a piezoelectric actuator and then converted to the electrical signals. Thereafter, a boosting module becomes responsible for amplifying the electrical signals and refining/removing mechanical, acoustic and electrical noise. The boosted and refined electrical signal now can be read and interfered as characteristic features of the sample.

Application

- Measuring the hysteresis loop in magnetic materials.
- Measuring the primary magnetization curve.
- Measuring and plotting IRM and DCD curve.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Models	MDKB	VSMF	VSMFT	MDKG
Max. Power (kW)	5			9
Voltage (V)	0-50			0-60
Current (A)	0-100			0-150
Weight (kg)	400			450
Magnetic Field Power (T)	2 in 2 cm Gap/ 1 in 3 cm Gap			2 in 2 cm Gap 1 in 4 cm Gap
Coil	Resistance: 0.8 ff Max. Current: up to 100 A Cooling: Oil-cooled Flow Rate: up to 1 L/min			Resistance: 0.8 ff Max. Current: up to 100 A Cooling: Water-cooled Flow Rate: up to 1 L/min
Probe	Shape: Cylindrical Dimensions (D×H): 8×20 cm Type: In Plane & Out of Plane			-
Oscillator	Adjustable Frequency from 37 to 64 Hz			-
Electromagnet	H shape, with two movable jaws (45 degree)			
Cross section of Magnet Jaws (cm)	14×14			
Magnet Gap (cm)	Variable from 1 to 10			
Magnetic Hysteresis (T)	$< 10^{-3}$ in Zero Current Mode			
Voltage Steps	0.01 V			
Sinusoidal Oscillation Frequency (Hz)	1 to 100000			
Peak to Peak Output Voltage (v)	10			
Noise (mV)	5			

About Company

Name of company	Danesh Pajouh Kashan
Email	almac@kashanu.ac.ir

Nanotechnology in Product

Integrated AGFM/VSM Magnetometer is able to measure the magnetic properties of the sample with magnetization as low as 0.0001 emu. This wide measuring limit makes this tool suitable to measure the magnetic properties of thin films and nanomaterials.

Differential Scanning Calorimeter (DSC)

Introduction

Differential Scanning Calorimeter is a thermo-analytical instrument in which the difference in the amount of heat required to increase the temperature of a sample and reference is measured as a function of temperature. Both the sample and reference are maintained at nearly the same temperature throughout the experiment. Generally, the temperature program for a DSC analysis is designed such that the sample holder temperature increases linearly as a function of time. Only a few milligrams of material are required to run the analysis. DSC is the most often used thermal analysis method, primarily because of its speed, simplicity, and availability.

Application

- Determining phase diagram, enthalpy, entropy, and specific heat.
- To observe melting and crystallization events as well as glass transition temperatures.
- Study of oxidation, as well as other chemical reactions.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	TA-1
Temperature Range (°C)	Ambient to 1450
Sensor Temperature (°C)	Ambient to 1650
Working Atmosphere	Air/ Vacuum
Vacuum Base (mbar)	< 0.05
Gas Inlet	One Inlet for N2 or Ar
MFC Range (ml/min)	0 to 200
MFC Accuracy (ml/min)	1
Scan Rate (°C/min)	0.01 to 50
Temperature Accuracy (°C)	0.01
Time Constant (s)	5
Resolution (mW)	0.1
Measuring Range (mW)	± 100

About Company

Name of company	Pishtaz Engineering Co.
Website	www.tspinstruments.com
Email	pishtazengineering@gmail.com

Nanotechnology in Product

Differential Scanning Calorimeter is an efficient tool for characterization of nanoparticles and nanocomposites. For instance, DSC can demonstrate a change in melting temperatures depending on grain size.

NanoSORD

Introduction

NanoSORD is an automated chemisorption analysis tool which is useful for evaluating physical and chemical properties of materials that are critical for process/reaction performance. Such properties can include the (reduction) temperature at which metals become catalytically active, amount of surface metal or active species available for reaction, the strength of specific types of active sites, or the ability of materials to perform after reduction/oxidation cycles. This tool uses the flowing gas method to acquire gas adsorption and desorption curves. This information is then used to calculate the total surface area according to the well-known BET theory. This device can also be used to study chemisorption bonds under controlled conditions of varying thermal energy (Temperature-programmed analyses, i.e. TPR, TPD and TPO).

Application

- Determination of the adsorption/desorption isotherms, as well as measurement of the specific surface area, diameter, volume, and porosities distribution.
- Performing Temperature Programmed analysis such as TPD, TPR and TPO.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Capability	BET Specific Surface Area Temperature Programmed (TPO,TPD,TPR)
Performance	Specific Surface Area: Min. 0.1 m^2/g Reproducibility: 0.5%
Gases	Compatible: H_2, O_2, CO, CO_2, NO, N_2O, NO_2, SO_2, NH_3, N_2, Ar, Kr, He Gas Flow Rate: 0-20 cm^3/min Input Pressure: Max. 3 bar Gas Lines: Stainless Steel (OD: 0.125 inch)
Hardware	Micro Volume Thermal Conductivity Detector: Dual-filament TCD Filament Material: Oxidation and ammonia resistant Filament Type: Nickel-Iron No. of Gas Input Ports: 5 ports Loop Volume: 500 ×L Mass Flow Controller: Two MFCs with flow rate 0-20 cm^3/min
Heating System	Mantel Max. Temperature: 450 °C Mantel Power: 250W Furnace Max. Temperature: 1100 °C Furnace Power: 800 W Furnace Heating Rate: 1 to 20 °C/min Controller Type: PID via PC
Power Supply	Voltage: 115-230 V Frequency: 50/60 Hz Power: 1800 W
Weight (kg)	40

About Company

Name of company	Tose'e Hesgarsazan Asia
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Nanotechnology in Product

NanoSORD is widely used for determination of nanostructured materials properties including specific surface area, adsorption properties of nanoparticles, reduction properties of metallic nano-oxides, and reaction parameters such as activation energy.

Gas Sensor and Catalyst Integrated Testing System

Introduction

Gas Sensor and Catalyst Integrated Testing System is designed and constructed by combining two devices, i.e. catalyst test to measure the heterogeneous catalysts performance and semiconductor sensors testing system for sensitivity and selectivity. Since optimization of sensitive materials in semiconductor sensors are linked to the performance of the catalyst, this equipment is able to simultaneously measure sensor performance and catalytic properties of a material.

Application

- Characterizing the performance of a catalyst as a function of operating variables such as flow rate, temperature, etc.
- Developing new products and comparing the effects of substrates, coatings, and precious metals, on performance.
- Testing performance of semiconductor sensors in terms of sensitivity and selectivity.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Resistance (ff)	5×102-5×1010
Gas Concentration (ppm)	0.1 to 10000
Gas Flow Rate Control (ml/min)	1
Fluid Flow Control (×l/h)	1
Temperature Control Accuracy (%)	0.1
Dimensions (L×W×H) cm	90×50×80
Other Features	• Mass Flow Controller • Electric and Manual Control Valves • Syringe Pump with High Accuracy • Manual or Computerized Flow Control • Furnace Max. Temperature: 1000 °C • Temperature Controllers • Gas Injection Ability • Sensor Chamber • Catalytic Reactor • Moisture Control • Data Acquisition Software

About Company

Name of company	Tose'e Hesgarsazan Asia
Website	www.hesgarsazan.com
Email	sensiran@gmail.com

Nanotechnology in Product

Metal nanoparticles have a higher surface area, so there is increased catalytic activity because more catalytic reactions can occur at the same time. Therefore, Gas Sensor and Catalyst Integrated Testing System is an efficient tool to evaluate the catalytic activities of nanomaterials.

Membrane Gas Separation and Permporometry System (MGSPS)

Introduction

Membrane Gas Separation and Permporometry System (MGSPS) is an analytical instrument used for gas separation with different membranes and Permporometry analysis. Permporometry is a method by which the characteristics of the interconnecting "active" pores of an ultrafiltration membrane can be measured. It is these "active" pores that are responsible for the actual membrane performance. Permporometry is based on the controlled stepwise blocking of pores by condensation of a vapor present as a component of a gas mixture and the simultaneous measurement of the gas flux through the membrane.

Application

- Performing membrane separation and Permporometry analysis.
- Conducting separation at different temperatures and pressures.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Mass Flow Controller	Preparing Feed Gas with Precise Composition
Electric and Manual Control Valves	Changing in Gas Flow Direction
Manual Flow Control	Precise Adjustment of Gas Flow
Temperature Controller	Precise Temperature Adjustment
Pressure Transducer	Indicating Gas Flow Pressure
Membrane Process Test Module	Conducting Process tests
Saturator	Gas Stream Saturation with Normal Hexane
Upstream Pressure Adjustment	Precise Adjustment of Pressure
Bubbler Flow Meter	Measuring the Discharged Gas Flow from the Module
Cold Trap Chamber	for Cooling the Gas Flow
Membrane Test	Max. Pressure: up to 7 bar
Permporometry Test (nm)	2 to 50
Dimensions (L×W×H) cm	80×45×80

About Company

Name of company	Tose'e Hesgarsazan Asia
Website	www.hesgarsazan.com
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Nanotechnology in Product

Membrane Gas Separation and Permporometry System can be a useful analytical tool for characterization of membranes. For instance, an evaluation of nano-order pore size of membranes can be carried out using Permporometry analysis.

Analytical Instruments

In Vivo Imaging Systems

- High Resolution Animal SPECT Imaging System (HiReSPECT)
- Preclinical PET Imaging System
- Fluorescence Planar Imaging System (FluoVision)

Parto Negar Persia Co. Ltd

High Resolution Animal SPECT Imaging System (HiReSPECT)

Introduction

The HiReSPECT is a dual head small animal SPECT (Single Photon Emission Computed Tomography) imaging system that provides in vivo high-resolution three-dimensional images of physiological functions in small laboratory animals. This imaging technique requires delivery of a gamma-emitting radioisotope (a radionuclide) into the patient, normally through injection into the bloodstream. To acquire SPECT images, the gamma camera is rotated around the patient and projections are acquired at defined points during the rotation.

Application

- Imaging of small animals in different biomedical studies such as neurology, oncology, cardiology, immunology, and infection biology.
- Acceleration of drug and biomarker development.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Number of Detector Heads	2/ 4 (optional)
Crystal Material	CsI (Na)
Crystal Size (mm)	50×100
Active Area per Detector Head (mm)	96×45.6
No. of Crystal Elements per Head	3040
Number of PSPMTs per Head	2
Collimator Type	Parallel Hole
Intrinsic Spatial Resolution (mm)	1.2 ± 0.1
SPECT System Resolution (mm)	1.8 ± 0.2
Planar Resolution (mm)	1.5 ± 0.1
Readout Electronic Method	Subtractive Resistive
Single Acquisition Method	Peak Detection
A/D Resolution (High Precision)	> 14 bit
Detector Rotation Range	> 90 degree
Detector Radius Range (cm)	15
Data Acquisition mode	Planer and Tomography
Projection Matrix	38×80
SPECT Image Matrix	256×256×128
Image Reconstruction Method	FBP, MLEM, OSEM
Dimensions (cm)	240×220×150
Weight (kg)	300

About Company

Name of company	Parto Negar Persia Co.
Website	www.pnpmed.com
Email	info@pnpmed.com

Nanotechnology in Product

While nanoparticles are usually designed for targeted drug delivery, they can also simultaneously provide diagnostic information by a variety of in vivo imaging methods.

Parto Negar Persia Co. Ltd

Preclinical PET Imaging System

Introduction

Preclinical PET Imaging System is a dedicated PET (Positron Emission Tomography) scanner which widely used for three-dimensional imaging of small animals such as rats and mice. This tool is extensively used in modern biomedical research since it provides a quantitative measure of the three-dimensional distribution of a radiopharmaceutical administered to a live subject noninvasively. This imaging technique involves the injection of a positron-emitting radiopharmaceutical, waiting to allow for systemic distribution, and then scanning to detect and quantification of patterns of radiopharmaceutical accumulation in the body.

Application

- Study of physiologic processes and molecular abnormalities which are the basis of diseases.
- Earlier detection and characterization of diseases.
- Accelerating the new drug development cycle.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

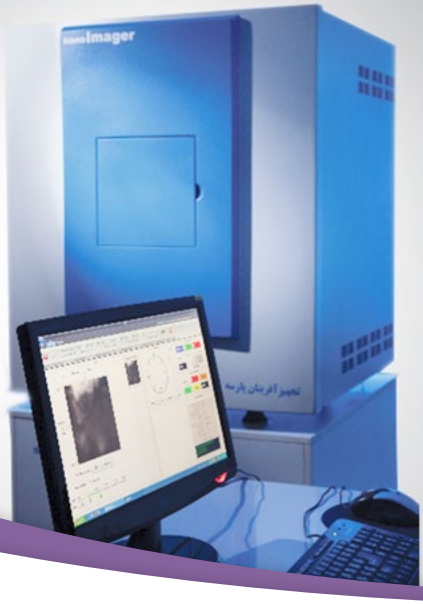
Device Model	Xtrim PET
Single-bed Axial FOV (cm)	5
No. of Detector Rings	24
Transaxial FOV (mm)	100
Bore Opening (mm)	110
LYSO Crystal Size (mm)	10×2×2
Total No. of Crystals	5760
Spatial Resolution (mm)	1.8 without Resolution Recovery
Standard Air Condition (°C)	20-25
Dimensions (cm)	150×150×180
Weight (kg)	250

About Company

Name of company	Parto Negar Persia Co.
Website	www.pnpmed.com
Email	info@pnpmed.com

Nanotechnology in Product

While nanoparticles are usually designed for targeted drug delivery, they can also simultaneously provide diagnostic information through a variety of in vivo imaging methods.



Fluorescence Planar Imaging System (FluoVision)

Introduction

Fluorescence Planar Imaging (FPI) is the most widely used macroscopic fluorescence imaging technique, which directly detects the fluorescence photons on the surface of an imaged small animal using a camera. According to the locations of excitation light source and camera, FPI can be formed in two different modes: epi-illumination mode and transillumination mode. Epi-illumination mode places excitation source and camera at the same side of the imaged small animal, which collects fluorescent photons in the same direction of the reflected excitation lights; thus it is also called fluorescence reflectance imaging (FRI). As an alternative, transillumination mode places the imaged small animal between excitation light source and camera.

Application

Tracing biomedical processes at cellular and subcellular levels in vivo and noninvasively in wide applications such as gene expression, protein function, and cell therapy.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Camera and Lens	16 MP CCD camera
Detector Type	8×8
Pixel Size (W×H) µm	8.4×9.8
Read Noise (e-)	Less than 1e- at 13.5 MHz
Field of View (FOV) cm	Max. 12×12
Quantum Efficiency	>85% from 500-650 nm >40% from 650-850 nm from 650-850 nm
CCD Operating Temperature (°C)	-10
Dark Current (e/pixel/s)	<0.0003
Minimum Detectable Radiance (photons/sec/cm²/sr)	45
Binning	1×1, 2×2, 4×4, 8×8, 16×16
Frame Rate	15 fps at 1024×1024 pixels
Fluorescence Emission Filters	450/40, 500/40, 540/10, 560/10, 700/40, 800/40
Resolution (mm)	<0.5
Dimensions (cm)	90×70×80
Weight (kg)	6

About Company

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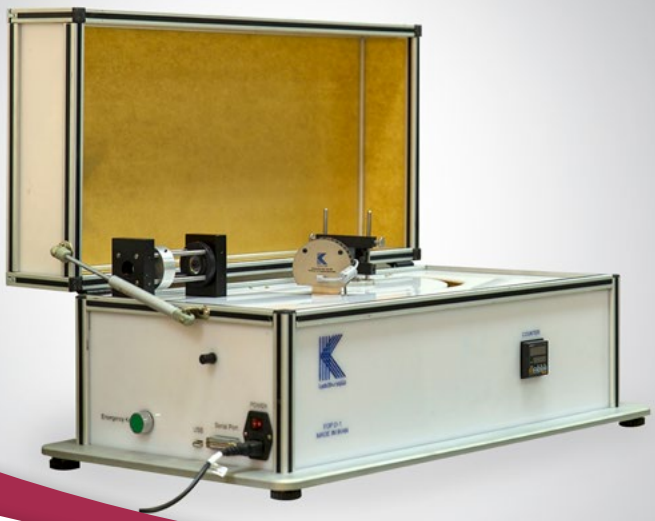
Nanotechnology in Product

While nanoparticles are usually designed for targeted drug delivery, they can also simultaneously provide diagnostic information through a variety of in vivo imaging methods.

Analytical Instruments

Profilometers and Thickness Measurement Tools

- Thin Film Thickness Measurement Tool
- Profilometer



Thin Film Thickness Measurement Tool

Introduction

Thickness Measurement Tool is a thin film measurement device which works based on the Fresnel diffraction from a phase step. When a thin film that is prepared in a step form on a substrate and coated uniformly with a reflective material is illuminated by a parallel coherent beam of monochromatic light (e.g. laser beam), the Fresnel diffraction fringes are formed on a screen perpendicular to the reflected beam. The visibility of the fringes depends on film thickness, angle of incidence, and light wavelength. Measuring visibility versus incident angle provides the film thickness. Since the film thickness is obtained by fitting experimental data on a linear function, the accuracy of the measurement and the reliability of results is very high.

Application

Thin films thickness measurement in single and multi-layers from 20 nm to 2 μm.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	FDP-D1
Radation Source	Laser
Laser Power (mW)	Adjustable from 5 to 15
Collimator	Including 2 Lenses and a Pinhole with a Linear Accuracy of 5 µm
Goniometer	Min. Accuracy of 1 Minute at Angle with movable arm
Motor	Motor for Changing the Angle
Camera	CCD Camera with 5 µm pixel size
Software	Image Processing and Displaying Thickness
Measurement Range	20 nm to 2 µm
Other Features	3-axis Holder for Sample and Camera

About Company

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Nanotechnology in Product

Thin Film Thickness Measurement Tool provides a reliable and easily applicable method for measuring film thickness from several nanometers to several micrometers, with an accuracy of a few nanometers using simple optics.

Profilometer

Introduction

Profilometer is a measuring instrument used to measure a surface's profile, in order to quantify its roughness at the nanometer scale. This tool uses a probe to detect the surface, physically moving a probe along the surface in order to acquire the surface height. This is done mechanically with a feedback loop that monitors the force from the sample pushing up against the probe as it scans along the surface. A feedback system is used to keep the arm with a specific amount of torque on it, known as the 'setpoint'. The changes in the Z position of the arm holder can then be used to reconstruct the surface. This technique requires force feedback and physically touching the surface, so while it is extremely sensitive and provides high Z resolution, it is sensitive to soft surfaces and the probe can become contaminated by the surface.

Application

- Thickness measurement of single-layer or multilayer films, coatings, as well as non-reflective layers.
- Surface roughness measurement.
- Flatness or curvature measurement.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	50.10.S
Vertical Resolution (nm)	50±10
Lateral Resolution (μm)	5
Scan Range (mm)	3×3
Optical Detector	Double Photodiode
Weight (kg)	30
Dimensions (cm)	60×60×40

About Company

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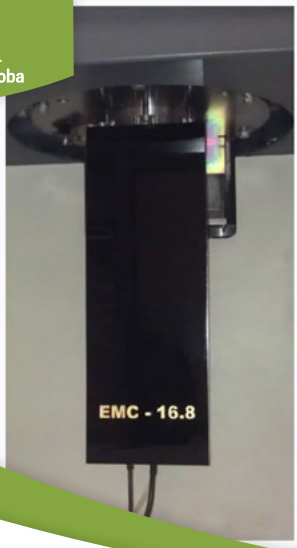
Nanotechnology in Product

Profilometer is an efficient tool for determining the surface profile of a sample on the nanometer scale. This surface texture measuring system can measure a vertical range up to 50 nm.

Analytical Instruments

Other Equipment

- EMC Camera
- Hyperthermia Equipment



EMC Camera

Introduction

EMC Camera is designed to directly attach to the bottom of an electron transmission microscope (TEM) to capture images and intensity of a variety of high-energy radiations. In this camera, each type of radiations is transformed into visible light using its especial phosphorescent screen. The image is then recorded using a highly accurate and sensitive optical system onto a CCD sensor. This camera is equipped with a CCD sensor with a resolution of 16 MP which has been cooled up to 50 oC below ambient temperature.

Application

To record images captured by electron beams, X-ray and gamma in a digital way.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Device Model	EMC 16.8 PC/SC
Optics	1X MACRO High-resolution Lens
Phosphorescent Screen	Polycrystalline YAG: Ce Diameter: 55 mm Stable up to 400 °C for High-intensity Beams such as Electron Diffraction Patterns
Sensor	Scientific Grade: KAF-16803 Pixel Count: 16.8 MP Pixel Size: 9×9 µm, Microlensed Active Sensor Area: 36.8×36.8 mm Full Well Capacity: 100 ke- Dynamic Range: 80 dB Green Light Quantum Efficiency: 60% Read Out Noise: 9e- at 4 MHz Dark Current: 3e-/Pixel/S at 25 °C Dark Current Doubling Temperature: 6.5 °C Anti-Blooming:100X Maximum Data Rate: 10 MHz
Cooling	Double Stage, Thermoelectric Cooling to -55 °C
Software	"EMC Capture" developed for fast and easy image capturing, processing and scale bar burning

About Company

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Nanotechnology in Product

EMC Camera is one of the main parts of a transmission electron microscope (TEM), which widely used in nanotechnology.

Hyperthermia Equipment

Introduction

Hyperthermia Equipment is a cancer treatment tool, in which body tissue is exposed to high temperatures. Magnetic hyperthermia is based on the use of magnetic nanoparticles to remotely induce local heat when a radiofrequency magnetic field is applied, provoking a temperature increase in those tissues and organs where the tumoral cells are present. With this aim, magnetic nanoparticles must be strategically surface functionalized to selectively target the injured cells and tissues.

Application

Cancer treatment.

Certificates and standards

- Certificate of Nanotechnology

Technical specifications

Power Supply	220 V, 50-60 Hz
Power (W)	300
Working Frequency (Hz)	Adjustable at 100, 200, 300, 400
Thermometer	Thermistor (with 0.1 °C Accuracy)
Chamber Dimensions (D×H) cm	5×4

About Company

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Nanotechnology in Product

The use of magnetic nanoparticles is currently a prominent topic in healthcare and life science. Due to their size-tunable physical and chemical properties, these nanoparticles have demonstrated a wide range of applications ranging from medical diagnosis to treatment.

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