PRINCETON SCIENTIFIC

CORPORATION

SOLUTIONS FOR
RESEARCH, DEVELOPMENT
& PRODUCTION

www.princetonscientific.com

MATERIALS

Leading supplier of advanced materials for research, industrial, and laboratory applications.

- Metal Single Crystals & Bicrystals
- Highest Purity Materials
- Oxide Single Crystals
- Evaporation Materials
- Thin Film Materials
- Sputtering Targets
- Backing Plates
- Optical Materials
- Bonding
- Fluorides
- Chlorides
- Infrared
- NLO/Laser Crystals
- Monocrystalline: Sapphire, Quartz
- Undoped Garnets: YAG, GGG
- Re-polishing & orienting of customer's samples

TENSIOMETERS

Pioneering smartphone-based technology with precise surface measurements in a compact device.

- With automatic or manual dropper
- Accurate contact angle, surface tension, surface energy, and sliding angle measurements
- Effortless setup
- Intuitive operation
- Dynamic Sessile Stage
- Hamilton Syringe with threaded plunger ensures precision in drop generation

WIRE SAWS

Wire saws for cutting semiconductors, ferrites, metals, glasses and other hard or brittle solids, using two different methods: wet and dry cut.

- Cut surfaces of nearly "lapped" quality
- Minimal loss of material
- Cutting that does not introduce deformations
- Wire diameters from 20 µm to 60 µm
- No "wandering" of cutting wire in an unintended direction
- Cut samples up to a size of 80x80x150 mm
- Semi-automatic, requires no supervision

UHV TECHNOLOGY

A wide selection of vacuum products & equipment for the research community and high tech industry which include:

- Manipulators
- Drives and Motions
- UHV Chambers
- UHV Valves & Accessories
- Components

VACUUM SYSTEMS

We offer comprehensive turnkey solutions for vacuum systems, along with custom engineering services.

- Bell-Jar Type Thermal Systems
- Thermal Evaporator Systems
- Thermal & Sputter Combined Systems
- Magnetron Sputtering Systems
- High-Power Sputtering Systems
- E-Beam Systems
- PECVD Systems
- Space Simulator Systems
- Load-Lock Equipped Coating Systems
- Glove-Box Adapted Vacuum Systems
- Vacuum Furnace & Bake-Out Systems

PARTICLE BEAM LINE

Our areas of expertise include beamline systems, beam diagnostic devices for research-, industrial-, and commercial accelerator systems.

- Vacuum Technology
- Particle Accelerators
- Beam Diagnostics
- Faraday Cups
- High Vacuum Feedthroughs
- Metal-Ceramic Bonds
- Beam Stopper
- RFQ Accelerator Structures
- Variable Segmented Aperture
- Jaw Slit Systems
- Rotating Wire Scanner

PLASMA TECHNOLOGY

Extensive range of Vacuum Plasma Systems and Supporting Equipment

- DC Power Supplies
- RF Generators
- Plasma Cleaners
- Magnetron RF & DC Sputtering Sources
- Automatic Matching Network
- Glovebox Systems

DESKTOP COATERS

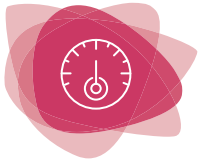
Elevate your research and production processes with our state-of-the-art precision vacuum coating systems.

- Sputter Coaters
- Carbon Coaters
- Turbo-pumped Coaters
- Thermal Evaporation Coaters
- PLD & Thermal Evaporation Systems
- Vacuum Coaters for glovebox

About Princeton Scientific Corporation

Founded in 1991, Princeton Scientific Corp. is a worldwide supplier of material science & engineering related products, plus particle beam line technology, wire saws, UHV technology and plasma technology for scientists, engineers, and industrial manufacturers.

MATERIALS



TENSIOMETERS

WIRE SAWS

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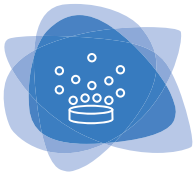


DESKTOP COATERS

ADDITIONAL SERVICES

We have an excellent and long-standing reputation for Metallic Single Crystals, Sputtering Targets, Superconductor substrates, Laser Crystals, Optical Materials, Opto-Electronic Components, and various Oxide Crystalline Materials within the scientific community.

Not only do we offer crystal boules, blanks, semi-finished- and finished products in the form of wafers, windows, lenses, prisms, tubes, rods and crucibles, but also cutting and polishing services for such materials. In addition to materials, we also offer Precision and Diamond Wire Saws, Particle Beam Line & Diagnostics, UHV Technology, Vacuum Systems and Plasma Technology.

Princeton Scientific Corp. offers:

- **Precision & Diamond Wire Saws**
- **Particle Beam Line & Diagnostics**
- **Vacuum Systems**
- **UHV Instruments & Components**
- **Tensiometers**
- **Desktop Coaters**
- **Instruments & Electronics for Plasma Technology**

All of these devices are designed and built to the highest quality standards.

SPUTTERING TARGETS

Princeton Scientific Corp. offers Sputtering targets made of - Metals, non-metals and chemical compounds with purities ranging from 99.9% to 99.9999%.

We offer standard, single element, pure metals and custom compounds. We also have various geometric shapes; round, rectangular, as well as multi-tile and stepped constructions are possible.

Please review our standard and specialty target list for more information. Princeton Scientific can produce sputtering targets to your specific needs. We will help to select appropriate target material, fabrication process, and bonding assembly that ensures the success of your thin film deposition process. Our Sputter targets are prepared either by a melt- or a powder metallurgical process.

We also provide an assorted array of backing plates for your systems requirements. Also, our bonding services include various metallic or silver epoxy techniques.

BORIDES	CARBIDES	FLUORIDES	NITRIDES	SILICIDES
CrB2	B4C	AlF3	AlN	CrSi2
HfB2	Cr3C2	BaF2	BN	Cr3Si
LaB6	HfC	CaF2	HfN	HfSi2
Mo2B6	Mo2C	CeF3	NbN	MoSi2
NbB2	NbC	LaF3	Si3N4	NbSi2
TaB2	SiC	PbF2	TaN	PtSi
TiB2	TaC	LiF	TiN	TaSi2
WB	TiC	MgF2	VN	Ta5Si3
W2B	WC	KF	ZrN	TiSi2
VB2	WC 6%Co	Re/NaF	and others	Ti5Si3
ZrB2	WC 12%Co	Na3AlF6		WSi2
and others	VC	ThF4		VSi2
	ZrC	YF3		V3Si
	and others	and others		ZrSi2
				and others

SULFIDES / SELENIDES / TELLURIDES				
As2S3	PbS	NbSe2	TaTe2	ZnS
CdSe	PbTe	Nb-S	WSe2	ZnTe
CdS	MoSe2	NbTe2	WS2	and others
CdTe	MoS2	TaSe2	WTe2	
PbSe	MoTe2	TaS2	ZnSe	

METALS

Aluminium	Chromium	Lead	Platinum	Tantalum
Antimony	Cobalt	Lithium	Potassium	Tellurium
Barium	Gallium	Magnesium	Rhenium	Tin
Beryllium	Germanium	Manganese	Rhodium	Titanium
Bismuth	Gold	Molybdenum	Rubidium	Tungsten
Boron	Hafnium	Niobium	Ruthenium	Vanadium
Cadmium	Indium	Nickel	Selenium	Zinc
Calcium	Iridium	Osmium	Silicon	Zirconium
Carbon	Iron	Palladium	Strontium	

RARE EARTH

Cerium	Gadolinium	Neodymium	Terbium	Various Rare
Dysprosium	Holmium	Praseodymium	Thulium	Earth Alloys
Erbium	Lutetium	Samarium	Ytterbium	
Europium	Lanthanum	Scandium	Yttrium	

ALLOYS

Al/B	Au/Pd	Co/Ni	Ge/Si	Pt/Ru
Al/Cu	Au/Pt	Co/Ta/Zr	Ge/Te	Pt/Ag
Al/Cu/Si	Au/Sn	Cr/SiO2 Cermet	In/Sn	Sb/In
Al/Cr	Au/Zn	Cu/Al	Ir/Mn	Sb/In/Sn
Al/Li	Bi/Sb	Cu/Cr	Ni/Cr	Si/Al
Al/Mg	Bi/Sb/Se	Cu/Ga	Ni/Fe	Si/Cr
Al/Si	Bi/Sb/Se/Te	Cu/Ni	Ni/Ti	Ta/Ti
Al/Ti	Bi/Sb/Te	Cu/Sn	Ni/V	Ti/Al
Au/Sb	Bi/Se	Fe/Al/Si	Ni/Zr	Ti/W
Au/Ag	Bi/Te	Fe/Cr	Os/Ru	Ti/Zr
Au/B	Cd/Te	Fe/Mn	Pb/Se	W/Ti
Au/Be	Co/Cr	Fe/Ru/Ga/Si	Pb/Te	Zn/Al
Au/Ge	Co/Fe	Fe/Si	Pb/Se/Te	Zr/V
Au/Ir	Co/Nb/Zr	PFe/Si/B/C	Pd/Pt	and others

OXIDES

Al2O3	CuO	PbZrO3	Supercond.	Y2O3
Sb2O3	HfO2 unstab.	LiNbO3	SrO	ZnO
BaTiO3	HfO2/CaO	MgO	SrTiO3	ZnO dop.
Bi2O3	HfO2/Y2O3	MoO3	SrZrO3	ZrO2 unstab.
Bi2TiO5	In2O3	Nb2O3	Ta2O5	ZrO2/CaO
Bi4Ti3O12	ITO	Nb2O5	ThO2	ZrO2/Y2O3
BiTiO3	LaAlO3	Re2O3	SnO2	and others
CeO2	La2O3	SiO2	TiO2	
CrO3	PbTiO3	SiO	WO3	

Backing Plates

Backing plates are available in the following materials:

- Copper
- Stainless Steel
- Aluminum
- Molybdenum
- Invar
- Kovar

EVAPORATION MATERIALS

Princeton Scientific Corp. provides a wide variety of evaporation materials for the vacuum deposition industry. Our materials are available in various purities ranging from 99.9% to 99.9999%.

Evaporation material can be made to order in the following forms:

- **Chunk**
- **Foil**
- **Pellet pieces**
- **Wire**
- **Rod**
- **Shot**
- **Slug**
- **Starter**
- **Source**
- **Tablet**
- **Granules**

EVAPORATION MATERIALS

Al
AlSb
AlB2
AlF3
Al2O3
AlP

Sb
Sb2S3
Sb2O3
Sb2Te3

As
As2O3
As2Te3

BST
BaS
BaZr03
Ba
BaFe12O19
BaF2
BaO
BaO2
BaTiO(3)

Bi
Bi2O3
Bi2S3
Bi2Te3
Bi4Ti3O12

B
B4C
BN
B2O3

Cd
Cd3As2
CdCl2
CdF2
CdO
CdSe
Cd2SnO4
CdS
CdTe

Ca
CaF2
CaH2
CaO
CaS
CaTiO3
Ca3(PO4)2
Ca10 (OH)2 (PO4)6

C

Ce
CeB6
CeF3
CeO2

CsF
CsI

Cr
CrO3
CrB2
Cr3C2
CrF3
Cr2N
Cr2O3
CrSi2
Cr2S3

Co
CoFe2O4
CoO
Co3O4
CoSi2

Cu
CuS
Cu2O
CuO
Cu3P
CuSe
Cu2S

Dy
DyF3
Dy2O3

Er
ErF3
Er2O3

Eu
Eu2O3

Gd
Gd2F3
Gd3Ga5O12

Ga
GaSb
GaAs
GaN
Ga2O3

Ge
Ge3N4
GeO2
GeSe2
GeS
GeTe

Au

Hf
HfC
HfO2

Ho
Ho2O3

In
In2Te3
InSb
InN
In2O3
In2O3/SnO2

Ir
IrO2

Fe
FeB
Fe3C
NiFe2O4
Fe2O3
Fe3O4
FeSi2
FeS2

La
LaAlO3
LaB6
La2O3
(La0.7Sr0.3)MnO3
LaTiO3

Pb
PbO
PbTe

Li
Li2CO3
LiCoO2
LiF
LiMn2O4
LiNbO3
Li2O
Li3PO4

Lu
Lu2O3

Mg
MgAl2O4
MgB2
MgF2
MgO
Mg2Si
MgS

Mn
MnO
MnO2
Mn2O3
MnTe

HgTe

Mo
MoB
MO2C
MoS2
MoO3
MoO2
MoSe2
MoSi2
MoTe2

Nd
Nd2O3

Ni
Ni2B
NiSi2
NiO
NiTe

Nb
NbC
Nb2O5
NbO2
NbSe2

Os

Pd
PdO

P
P2O5

Pt

KNbO3

Pr
Pr2O3

Re

Rh
Rh2O3

Ru
RuO2

Sm
SmF3
Sm2O3

Sc
Sc2O3

Se
SeO2

Si
SiC
SiO2
SiO
Si3N4
SiS2

Ag
AgCl
Ag2O

Na
Na5Al3F14
Na2CO3
NaCl
NaF
Na2O2

Sr
SrCO3
SrF2
SrMoO4
SrO
SrRuO3
SrS
SrTiO3
SrZrO3

S

Ta
TaC
TaN
Ta2O5
TaSe2
TaSi2

Te
TeO2

Tb
TbF3
TbOF
Tb4O7

Sn
SnF2
SnO2
SnS2
SnTe

Ti
Ti3Al
TiB2
TiC
TiO2
TiF3

TiO
TiN
Ti2O3
TiSe2
TiSi2

W
WC
WO3
WSe2
WSi2
WS2
WTe2

V
VC
VO2
VN
V2O3
V2O5
VSe2
V2S3

Yb
YbF3
Yb2O3

Y
Y3Al5O12
Y3Fe5O12
YF3
Y2O3

Zn
ZnF2
Zn3N2
ZnO
Zn3P2
ZnSe
ZnS
ZnTe

Zr
ZrB2
ZrC
ZrCl4
ZrF4
ZrN
ZrO2
ZrSi2
ZrO2/Y2O3

LASER CRYSTALS

We offer common host crystals such as YAG (Yttrium aluminium garnet) or YVO4 (Yttrium orthovanadate) with various dopants such as Neodymium, Ytterbium, Erbium and Chromium. The ready to use (coated) or uncoated laser rods are manufactured to the highest standards of our crystal technology.

All of the LASER COMPONENTS' AR coatings are optimized for high power lasers and are available for the wavelength range from 193 nm to 3000 nm.

Both the bandwidth (depending on the wavelength) and the effectiveness of the coating can be influenced by the various designs and different coating materials. Thus the optimal coating for each application can be made available.

Custom sizes, polished, unpolished, coated and uncoated crystals are available upon request. Please provide us with your detailed specs or drawing so we can provide our most competitive offer.

KTO
KTA
KDP
BBO

LiNbO3
LiTaO3
Cr:YAG
MgO:LiNbO3

YAG CRYSTALS

Er:YAG
Nd:YAG
Yb:YAG
Cr, Tm, Ho:YAG

YLF CRYSTALS

Ho:YLF
Nd:YLF
Tm:YLF
Er: YLF

YSGG CRYSTALS

Er:YSGG
Er,Cr:YSGG
Cr,Nd:YSGG
Cr,Tm,Ho:YSGG

YAP CRYSTALS

Er: YAP
Nd: YAP
Tm: YAP

OTHER

Alexandrite
Ti: Sapphire
Forsterite
Nd: YV04, Diffusion bonded crystals

METAL SINGLE CRYSTALS

Application: Metal single crystals are required among others, for basic research (surface physics, catalytic chemistry, investigation of material properties), for monochromators (X-ray, neutrons) and electrons (W-needles, LaB6, CeB6).

Properties: The quality of our crystals is characterized by an especially high mosaicity. Production of metallic single crystals is carried out in most modern equipment with highest quality requirements. For crystal growth using the Bridgman-, Czochralski- and zone melting techniques only the highest purity starting materials are used.

Geometric: Several geometries are available. See our website for all geometries we offer. When requesting a quote, please specify geometric shape. In case the desired geometrics are not available on our website, please send us a drawing.

Mosaicity of the elements: The mosaicity describes the deviation of the perfect structure of the crystal. It is the angle specification which describes the deviation of a reflective X-ray jet and the ideal reflex angle. A small angle stands for a perfect crystal structure.

During application of the surface, particular emphasis will be put on orientation accuracy of the crystallographic direction. **Orientation accuracy:** up to <0,05°.

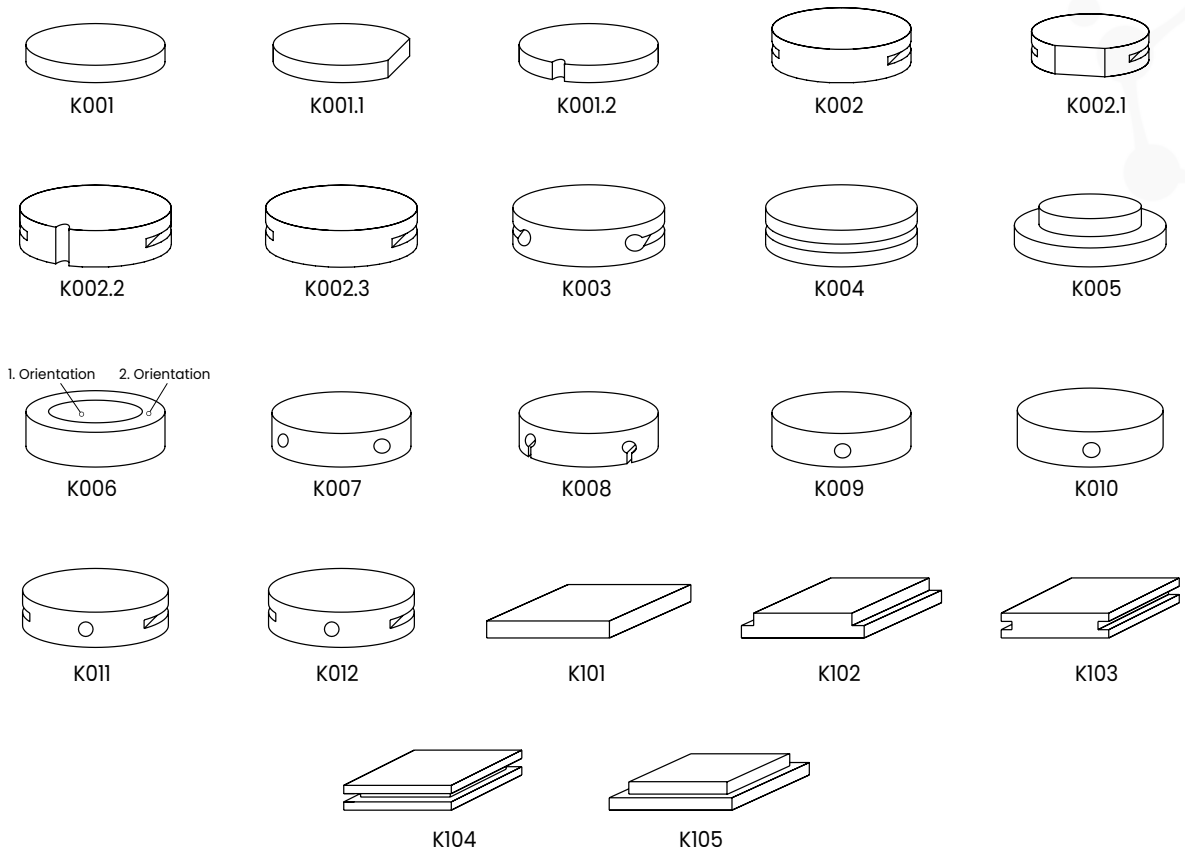
The especially careful surface conditioning (polishing) allows, after low heat and sputter cycles, the direct investigation of up to several 1000 nm spread nuclear terraces. **Polishing:** roughness < 1 nm (also with soft elements like Au or Pb).

	13 26.982 **Al** Aluminium	51 121.76 **Sb** Antimony	83 208.98 **Bi** Bismuth	48 112.41 **Cd** Cadmium	24 51.996 **Cr** Chromium	27 58.933 **Co** Cobalt	29 63.546 **Cu** Copper	66 162.5 **Dy** Dysprosium	64 157.25 **Gd** Gadolinium	32 72.640 **Ge** Germanium
Purity	6N	6N25	N5	N5	N6	4N	5N	3N5	4N	N
	79 196.97 **Au** Gold	72 178.49 **Hf** Hafnium	67 164.93 **Ho** Holmium	49 114.82 **In** Indium	77 192.22 **Ir** Iridium	26 55.845 **Fe** Iron	82 207.20 **Pb** Lead	3 6.9410 **Li** Lithium	12 24.305 **Mg** Magnesium	42 95.950 **Mo** Molybdenum
Purity	5N	4N ex Zr 3	N5	6N	4N	4N	5N	2N8	5N	4N
	28 58.693 **Ni** Nickel	41 92.906 **Nb** Niobium	46 106.42 **Pd** Palladium	78 195.08 **Pt** Platinum	75 186.21 **Re** Rhenium	45 102.91 **Rh** Rhodium	44 101.07 **Ru** Ruthenium	14 28.086 **Si** Silicon	47 107.87 **Ag** Silver	73 180.95 **Ta** Tantalum
Purity	4N	4N	5N	4N	4N	4N	4N	5N	5N	4N
	52 127.60 **Te** Tellurium	50 118.71 **Sn** Tin	22 47.867 **Ti** Titanium	74 183.84 **W** Tungsten	23 50.942 **V** Vanadium	39 88.906 **Y** Yttrium	30 65.380 **Zn** Zinc	40 91.224 **Zr** Zirconium		
Purity	6N	6N	4N	5N	4N	3N5	6N	4N ex Hf *		

* crystal size limited to a few millimeters

Available Geometries

Princeton Scientific offers various geometric shapes when it comes to Metal Single Crystals. Below you will find most common shapes, however custom designs are also feasible. Detailed drawings with template specifications required for quotation are listed on our website at ***https://princetonscientific.com/crystal-config***

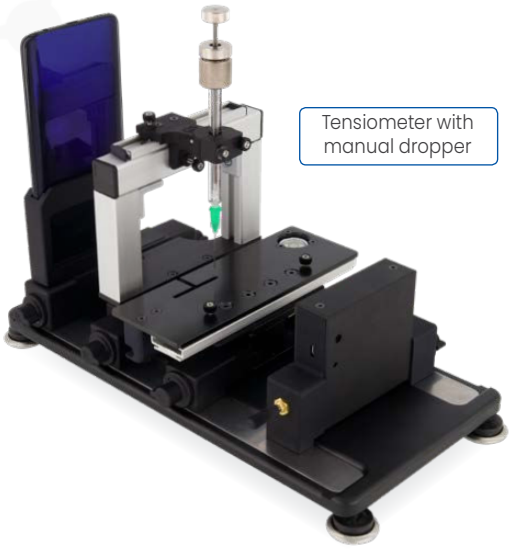


ADDITIONAL SERVICES

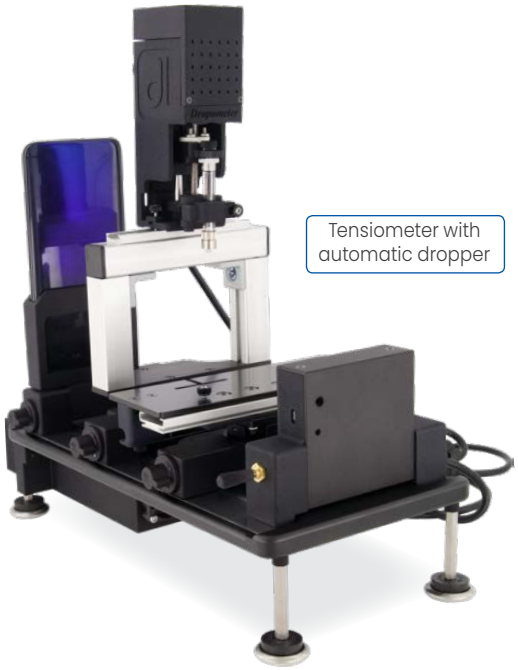
- High Quality Crystal Processing of customer provided materials
- Re-polishing of customer provided materials (both or single side)
  - Roughness <10nm (typically 1nm for hard metals and typically <1-5nm for soft metals, even for Pb)
  - orientation accuracy <2 deg
  - orientation accuracy <1 deg
  - orientation accuracy <0.4°
  - orientation accuracy <0.1° (possible up to <0.05°)
- Cutting and/or orienting customer provided crystals
- Laue pictures
- Measuring of roughness
- Diverse cuttings and cut of geometrics according to your specifications
- Diverse drillings
- Etching of the surface according to your specifications
- Install of a wire for direct electronic contact of the sample
- Install of chamfers
- Bonding & de-bonding of sputtering targets
- Complete coating services

TENSIOMETERS

Effortless setup, intuitive operation, and peer-reviewed accuracy. Providing accurate contact angle, surface tension, surface energy, and sliding angle measurements, Princeton Scientific Corporation offers researchers and educators the technical capabilities normally found in far more expensive and cumbersome scientific equipment.



Tensiometer with manual dropper



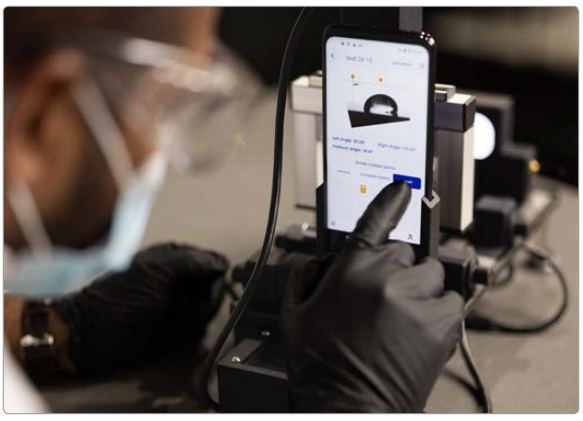
Tensiometer with automatic dropper

MEASUREMENT

- Static and dynamic contact angle
- Static and dynamic surface tension
- Sliding angle
- Surface energy

METHODS

- Young-Laplace and Polynomial
- Young-Laplace
- Polynomial
- Equation of States, Fowkes, Oss and Good



FEATURES

Cost-Effective

Our instrument drastically reduces the initial investment costs associated with tensiometers while maintaining high end features.

Easy To Use

The app at the heart of the tensiometer is simple and intuitive to use, bypassing any need for paid user-training courses. With our Dropometer you can be up and running in less than twenty minutes.

Smartphone-Based

The system doesn't require the use of additional laptops or desktop computers and benefits from the full connectivity of a smartphone.

Portable

Tensiometer's significantly reduced size and weight makes it the ideal choice for teaching and fieldwork measurements.

Peer-Reviewed

The patented technology that the tensiometer is built on was designed by experts in the field of tensiometry and has undergone extensive peer review, ensuring the system operates to the highest standards.

Product Specifications

Dimensions: 30(H) x 15(W) x 45(L) cm

Weight: 1 kg

Drop volume with manual dropper: 1 rotation is 5.29 µL

Min. drop volume with automatic dropper: 0.05 µL

MEASUREMENT				
	Sessile	**Energy**	**Tilted**	**Pendant**
Range	10° to 175°	Up to 100 mN/m	10° to 175°	Up to 75 mN/m
Resolution	0.01°	0.01 mN/m	0.01°	0.01 mN/m
Accuracy	0.35°	0.03 mN/m	0.35°	0.03 mN/m
Model	Young-Laplace and polynomial	Equation of states, Fowkes and, Oss and Good	Polynomial	Young-Laplace
Drop type	Sessile advancing, receding and static	Sessile static	Tilting sessile	Pendant static and dynamic

TILTING PLATE AND DOSING	
Control	Manual and Automatic
Range	0° to 60°
Dosing system	Manual & Automatic
Minimum Drop Volume with Automatic Dosing	0.05 µL
Drop Volume with Manual Dropper	1 rotation is 5.29 µL

SOFTWARE	
Application	Android and iOS based software
Security	Multiple user account per device
Data sharing	Email and cloud (Google drive, Dropbox, MS One drive and Box)
Interfaces	Bluetooth, wifi, usb, cellular

CAMERA	
Performance	10 fps
Zoom	Zoom
Focus	4x
Focus	Manual
Sensor	Trigger control based on camera level

ILLUMINATION	
Type	High power LED
Size	68 by 51 mm

ENVIRONMENT	
Temperature	10° to 45°
Humidity	Without condensation

INSTRUMENT DIMENSION	
Footprint	30(H) x 15(W) x 45(L) cm
Weight	1 kg

POWER	
Voltage	5 V battery only operation
Battery time	Up to 8 h

PRECISION WIRE SAWS

Precision wire saws available from Princeton Scientific have been developed with an improved cutting technique that utilizes the precision guidance of the width and uniform application of an abrasive slurry.

This results in:

- Surface is almost 'lapped' quality
- Cutting that does not introduce deformations
- Minimal loss of material
- Wire diameters from 20 µm to 60 µm
- No "wandering" of cutting wire into an unintended direction
- Cut samples up to size 80 mm x 80 mm x 150 mm
- Semi-automatic, requires no supervision

These precision wire saws are ideal for the precise cutting of:

- Semiconductors
- Ferrites
- Metals
- Glasses
- Other Hard or Brittle Solids

A variety of precision wire saws are available that can cut samples down to a thickness of 10 µm, with smooth cut surfaces where the roughness does not exceed 1 µm. With a goniometer mounted to the saw, very precise orientations of crystal surfaces are possible before the cutting process begins.

One saw, two cutting methods: dry and wet

The **WS-25 wire saw** is the first wire saw that can cut with free abrasive method as well as with diamond dotted wire. The WS-25 wire saw is fitted with an adjustable sample support with an electronic vertical axis. The sample is automatically moved up during the cutting process. The wire frame stays at the same vertical position throughout the entire process.

The **WS-25 wire saw** has been developed to meet two important requirements: 1) cutting should not introduce deformations or defects, and 2) loss of material should be minimized.

These two requirements have been met by the development of an improved cutting technique which utilizes the precision guidance of the wire and uniform application of an abrasive slurry. The WS-25 wire saw is a semi-automatic machine and requires no supervision during its operation. The wire saw can be used for precision cutting of semiconductors, ferrites, metals, and glasses, as well as many other hard or brittle solids. The WS-25 wire saw enables cutting of very thin slices (down to a thickness of 10µm) with smooth cut surfaces (where surface roughness does not exceed 1µm).

PRECISION WIRE SAW WS 25B

ADVANTAGES

- Semi-automatic, requires no supervision
- Can cut semiconductors, ferrites, metals, glasses and other hard or brittle solids
- Minimized material losses (>30 um)
- Slices samples perfectly parallel
- No additional lapping required
- Can be used with accessories to extend the saw's application in precision cutting

TECHNICAL DATA

- **Sample max. dimensions:** 80 mm x 80 mm, 150 mm length
- **Power supply:** 220-250 V/50 Hz or 110 V/60 Hz
- **Tungsten wire diameter:** 20-60 um
- **Diamond dotted wire:** 100-300 um
- **Wire Oscillation Frequency:** 150-200/min
- **Weight:** 68 kg
- **Dimensions:** 630 x 720 x 250 mm

Accessories

Extend the capabilities with accessories to aid in the precise cutting of crystallographically oriented crystals.

PSC Stereomicroscope

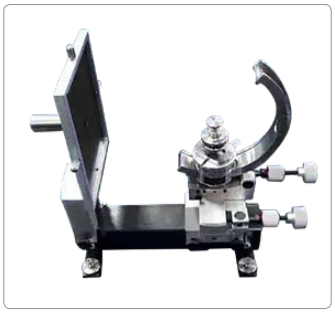
Our stereomicroscopes are used for stereoscopic observation of samples with the use of changeable magnification. Stereomicroscopes are mounted on to wire saws frame.

Vacuum Sample Holder

Vacuum Sample Holder is designed to use a vacuum to hold a glass plate, on to which samples are fixed with wax.

Goniometers

Our goniometers are designed for orientation of specimen when cutting along desired directions using either X-ray or optical orientation techniques.



Laue Cameras

Laue cameras are designed for the orientation of single crystal samples using back reflection known as the Laue method. They are used for cutting along strictly determined crystallographic plane

DIAMOND WIRE SAWS

Saws with wire on spool
Two-Way-Cut

Our two-way diamond wire saws work with a spool wire, which is wound onto the wire drum nearly fully automatically. During the separating cut, the diamond wire moves alternately forwards and backwards over the entire length of the wire. This enables a small machine design despite an occupancy of 20 or 30 meters of diamond wire.

- Use of spool wires
- Automatic wire spooling
- Small, compact saw design
- Long wire lengths (20 - 30 m)
- Thinnest cut-offs (from 0.08 mm)

Saws for wire loops
One-Way-Cut

Our one-way diamond wire saws work with endless wire loops. Since these only cut in one direction and the motor is not alternately braked and accelerated again, it is possible to cut at correspondingly higher speeds. Depending on the type of saw, a wire loop 2 to 3 meters in length is used.

- Use of diamond wire loops
- Easy and fast application of these loops
- Higher cutting speeds - up to 12 m/s
- Clean cut surfaces - cut in one direction
- Thin cuts - from 0.35 to 0.80 mm

DWS.100

The diamond wire saw type DWS.100 is a table saw in horizontal design so that the smallest cut-offs can be observed with the naked eye or also by means of an attached microscope. The maximum workpiece cutting area is 90 x 90 mm and the recommended diamond wire thickness is 0.08 to 0.35 mm. The wire speed is 0-4 m/s.

DWS.175

The diamond wire saw type DWS.175 is a table saw in vertical design. The maximum workpiece cutting area is 175 x 175 mm and the recommended diamond wire thickness is 0.15 to 0.50 mm.

DWS.250 & 250E

The diamond wire saw DWS.250E (endless) is a one-way table saw in vertical design. The maximum workpiece cutting area is 250 x 250 mm. Diamond wire loops with a length of 2000 mm and thicknesses from 0.35 to 0.60 mm are used.

The DWS.250 type diamond wire saw is a large two-way vertical table saw. The maximum workpiece cutting area is 250x250 mm and the recommended diamond wire thickness is 0.20 to 0.50 mm. The wire speed is 0-4 m/s.

DWS.375 & 375E

The diamond wire saw DWS.375E (endless) is currently our largest one-way saw in vertical design. The maximum workpiece cutting area is T375 x H375 mm. Diamond wire loops with a length of 3000 mm and thicknesses from 0.35 to 0.80 mm are used.

The diamond wire saw DWS.375 is our largest two-way saw in vertical design. The maximum workpiece cutting area is T375xH375 mm. Suitable for diamond wires with a diameter of 0.25 to 0.5 mm at a length of 50m. Wire speed is 0-10 m/s.

Examples of separation

10-cent piece

Meteorite

IC-chip

Objective

UHV TECHNOLOGY

Princeton Scientific Corp. offers high quality vacuum products and systems.

We offer a wide selection of components for the introduction, handling and manipulation of substrates, wafers, and other samples in ultra-high vacuum (UHV), high vacuum (HV) or other controlled environments. UHV technology is a vast and ever-growing field of research that contributes to a wide array of industries. It is UHV technology that is leading the world to greater innovation and discovery. When your work is this important, it is crucial to know that you are receiving equipment of the highest quality and standards. Princeton Scientific's mission is to supply this high-quality technology to companies and institutions like yours, so you can continue to do the work that is changing the world.

MANIPULATORS

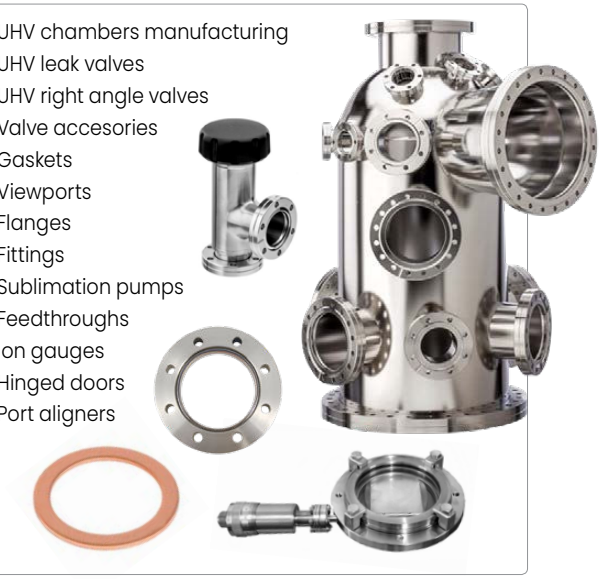
- Single bellows
- Dual bellows
- Sample holders
- Sample heating
- Motor controllers
- XY modules

DRIVES & MOTIONS

- UHV linear drives
- Rotary drives
- Wobble sticks
- Magnetic transfer probes
- Non-magnetic transfer probes
- Rotary platforms
- Z axis linear transfer

CHAMBERS, VALVES & ACCESSORIES

- UHV chambers manufacturing
- UHV leak valves
- UHV right angle valves
- Valve accesories
- Gaskets
- Viewports
- Flanges
- Fittings
- Sublimation pumps
- Feedthroughs
- Ion gauges
- Hinged doors
- Port aligners



COMPONENTS

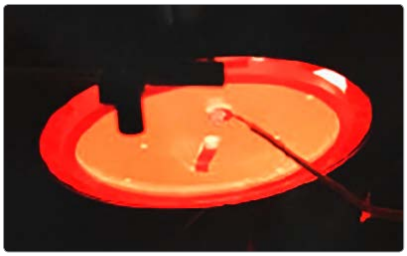
- CF, KF and ISO flanges and fittings
- Circular miniature feedthroughs
- Co-axial feedthroughs
- Power/high voltage feedthroughs
- Sub-miniature D feedthroughs
- Thermocouple feedthroughs
- Traxial feedthroughs
- Fibre optics
- Kapton wires and accessories
- Safety components
- Gauges
- Viewport accessories
- Special custom built vacuum equipment

VACUUM SYSTEMS

We offer comprehensive turnkey solutions for vacuum systems, along with custom engineering services.

THERMAL EVAPORATOR SYSTEMS

This box type Physical Vapor Deposition system is based on prismatic/cylindrical vacuum chambers. These systems have 2 – 4 thermal sources. Multi-layered thin films of two, three or four different materials can be prepared, and the system can be tailored to fit user needs to produce multilayered, nanosized metallic oxide, fluoride or nitride films, such as Si, Al, Ti, SiO, Au, Ag, WO, BaF2, and MgF2.



THERMAL & SPUTTER COMBINED SYSTEMS

This box-type Physical Vapor Deposition system, based on prismatic/cylindrical vacuum chambers, has 2 thermal and/or 1-4 DC-RF sputter sources enabling the user to do full co-evaporation. Multi-layered thin films of different materials can be prepared, and the system can be tailored to fit user needs to produce multilayered nanosized metallic oxide, carbide or nitride films, such as Si, Al, Ti, SiO, WO, BaF2, MgF2, TiO2, Si3N4, SiO2, and TiN.

BELL-JAR TYPE THERMAL SYSTEMS

Bell Jar type simple evaporator for day-to-day use. Up to four box style evaporators can be integrated. If needed, these can be dedicated for Zn, In, Cd, Ca, Pb evaporation, sequentially or to deposit any materials. Systems can be tailored to produce multilayered nanosized metallic oxide, fluoride and organic films. Standard features such as the thickness monitor and QCM sample rotation units can be comfortably utilized by the user. Typical cycle time for two-layer thin film coating experiment is about 1.5 hours. Base Pressure is 5×10^{-7} Torr.

VACUUM FURNACE & BAKE-OUT SYSTEMS

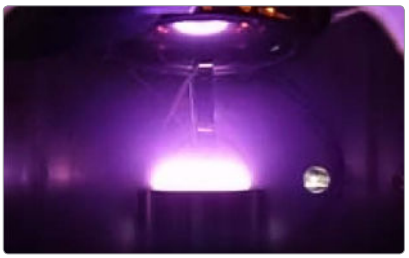
The Vacuum Furnace and Bake-Out System is produced out of SS304. The furnace can be used for outgassing & baking samples between 30 - 500 °C. Samples can be loaded vertically or horizontally. Various electrical feed-throughs can be added for real time monitoring of electronics. The PSC Vacuum Furnace and Bake-Out System can be tailored to fit user needs.

GLOVE-BOX ADAPTED VACUUM SYSTEMS

PSC Glove-Box Systems combine Glove-Box units supplied by dedicated Glove-Box specialists and PSC vacuum and electronic components. These systems can be configured with one or two vacuum chambers with hinged doors in the back and sliding doors on the Glove-Box side. There are added components such as vacuum pumps and QCM units. Systems easily pump down to $1x10^{-7}$ Torr vacuum levels. Components such as thickness monitors, sputter guns, evaporation sources and effusion cells can be added. The chambers are e-polished on the inside and outside. Systems are configured to run automatically with tailored LabVIEW programs. The Glove-Box sustains 0.1 ppm water vapor and oxygen levels with its blower and filter apparatus.

MAGNETRON SPUTTERING SYSTEMS

Box-type Physical Vapor Deposition systems are based on prismatic/cylindrical vacuum chambers. These systems have 1-4 DC/RF sputtering sources. Multi-layered thin films of 4 different materials can be prepared. The PSC Sputter System can be tailored to fit user needs to produce multilayered nanosized metallic oxide, carbide or nitride films, such as Ni, Fe, Au, Zr, Ti, Si, SiO2, ZnO, TiO2, Si3N4 and SiC, among others.



HIGH-POWER SPUTTERING SYSTEMS

HIPIMS systems are based on high energy pulsed DC magnetron technology. In this method, 500-1000 VDC short duration pulses are sent to targets with 100-500 A/cm^2 currents to generate very high ionization plasma density. Consequently, very dense, well-adhered, high-quality films can be obtained. Oxide and nitride films can also be made by HIPIMS reactive sputtering using metallic targets. The substrate holder can be biased to DC pulsed voltage with high accuracy synchronization to the target pulse. These systems can have up to 4 sputtering sources. Therefore, up to 4 multi-layered materials can be produced including nanosized metallic, oxide, fluoride or nitride films.

PECVD SYSTEMS

PSC has recently developed a PECVD (Plasma Enhanced Chemical Vapor Deposition) tube furnace system, which consists of a 300 W RF plasma source, optional split tube furnace, and 3 channel mass flow controller units for gases like Ar, H2, CH4. It is ideal for Graphene film production as well as TiN, TiC, SiC, Si3N4 films.

E-BEAM SYSTEMS

Water-cooled cylindrical/prismatic vacuum chambers are produced out of SS304 material. This system has 1-2 thermal and/or 6-crucible e-beam sources enabling the user to do full co-evaporation. Typical properties of the system can be given upon request. Multilayered thin films of different materials can be prepared. The system can be tailored to fit user needs to produce multilayered nanosized metallic oxide, carbide or nitride films.

SPACE SIMULATOR SYSTEMS

PSC has developed a space simulator system that enables the user to conduct vacuum, gas, and temperature-dependent experiments using a computer user interface. The chamber volume can be 200 - 1000 lt. and can house a thermal table which may be heated and cooled and may carry loads up to 100 kg. Base pressure level is 10^{-7} Torr and pressure can also be controlled by a leaking mixture of Ar, N2 and O2, H2 gases from 10^{-7} to 1000 mbar. The table can be cycled between -100°C and +150°C for long periods.

LOAD-LOCK EQUIPPED COATING SYSTEMS

Systems with Load-Lock chambers are preferable for faster processing and higher quality coating of products. Sample loading/unloading is done in the Load-Lock chamber. Transfer to the main chamber is performed using a magnetic transfer arm. Within our product range, Load-Lock enhancement is applicable to Thermal, Sputtering, E-Beam or HiPIMS type systems. It may be possible to complete the coating process in 10^{-7} Torr high vacuum cleanliness while loading a new wafer every 15 minutes with the Load-Lock setup.

PARTICLE BEAM LINE

Princeton Scientific Corp. supplies products and services to the accelerator scientific community.

Our areas of expertise include beamline systems, and beam diagnostic devices for research-, industrial, and commercial accelerator systems. We specialize in designing accelerator-related equipment. Our main industry contacts - such as scientists & engineers all over the world - support commitment to innovation, quality, and customer satisfaction. We provide end to end design and engineering and integration solutions to scientists worldwide. Our Faraday Cups, Beam Stoppers, Beam Profile Measurement Systems and UHV Linear and Rotating Feedthroughs are well known within the scientific community.

VACUUM TECHNOLOGY

We design and manufacture vacuum chambers of different shapes for various applications. As a speciality, we offer Al-chambers with inhouse developed Bi-metal-flanges. Cylindrical or rectangle UHV chambers are used for installation of beam diagnostic devices, vacuum gauges, electrical feedthroughs, and pumping aggregates. The distance between supporting flanges and beam axis should be uniform after optimization of various components, that must be attached. Universal elements such as compressed air actuated feedthroughs for example, can be designed with identical stroke and are subsequently exchangeable along the accelerator line.

METAL-CERAMICS BONDS

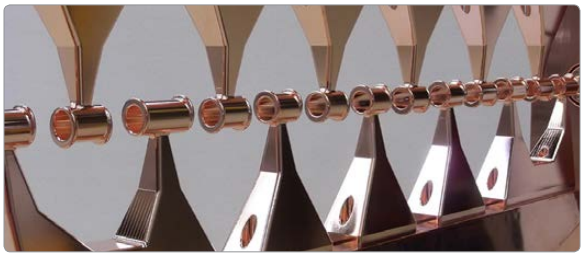
Ceramic chambers are widely used in accelerator units for injection, fast extraction and beam excitation. These alumina chambers are placed in fast pulsed (range of nanoseconds) electromagnets of the kicker, bumper, dumper or scanner application. The reason for applying ceramic chambers is to avoid shielding of a fast changing external magnetic field by metallic chamber walls and to avoid heating, due to eddy currents. To prevent accumulation of static charges and to reduce secondary electron emission on the ceramic surface the internal surface has to be coated by a thin low conductive layer.

RFQ ACCELERATOR STRUCTURES

Various RFQ structures of the 4-rod type
from pulsed to cw-operation.

- Design and manufacturing of RF-systems
- Design and manufacturing of vacuum systems

DRIFT TUBE PARTICLE ACCELERATORS



We have extensive experience in the field of particle accelerator design and manufacturing.

- IH-structures
- CH-structures
- Special Resonators, e.g. Buncher Cavities

JAW SLIT SYSTEMS

Jaw slit systems available are used for beam size limitation, beam analysis functions, and energy definition in beam transport systems of particle accelerators. The slit-jaw system can consists of a cooled copper block which is covered with a tantalum plate. To facilitate good heat conductivity between copper and tantalum, a special vacuum braze has been chosen (SCP 3 AT, 930°C Degussa). To avoid tension between Ta jaw and Cu body components, a thin copper plate has been placed between the jaw and the body of system.

HIGH VACUUM FEEDTHROUGHS

Universal precision high vacuum feedthrough with an accuracy of positioning of +0.03 mm (single or twin version). The subject feedthrough is provided for the linear translation of elements inside a high-vacuum system. The universal feedthrough allows for mounting of arbitrary elements at the bottom of the spindle (inside the vacuum). Cooling of the attached elements is possible through the bore of the spindle. In the field of accelerator technology, our universal feedthrough is useful for assembly of slit systems, emittance measurement devices, scanners and frequency tuners.

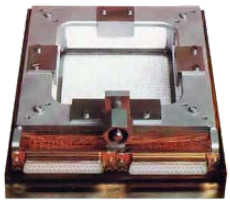
- Universal Precision High Vacuum Feedthrough
- Compressed Air Actuated High Vacuum Feedthrough
- Simplified Precision High Vacuum Feedthrough - Twin Version

BEAM PROFILE MEASURING SYSTEM

For measurement of intensity distribution of an accelerated ion or electron beam in two transverse directions (X and Y). Optional grids are available that permit measurement of additional planes. Principle: wires to be used for X and Y planes collect charged particles; the collected charge is then converted to a given energy level, which represents beam profile intensity.

Configuration of Complete System:

- Compressed air actuated high vacuum feedthrough (permits harp to move 'in' and 'out' of the beam path)
- Harp and frame with adapter (permits unit to be connected to compressed air actuated feedthrough)
- Signal processing electronics



FARADAY CUPS

For measurement of mean beam current of particle accelerator we offer cooled, uncooled or coaxial Faraday Cups. Accelerated particles (high energy primarily) are stopped in the cup and an electric charge is detected as corresponding electric current. The Faraday Cup may be moved into the beam by means of an air pressure actuated vacuum feedthrough.

EMITTANCE MEASUREMENT DEVICE

The device consists of precision high-vacuum feedthrough, detectors assembly with emittance measurement chamber, and slit/ detector assembly. Via a narrow slit, part of the beam is selected for measurement. Behind the slit, a detector system is positioned, permitting measurement of beam divergence for the selected bundle. This is accomplished by means of current measurement on the multistrip collector array.

CAPACITIVE PICK-UP PROBES

Various capacitive pickup probes custom made for your requirements

- Phase probes & Beam position monitors
- Design incl. signal calculation
- Engineering and manufacturing

LUMINESCENT SCREENS

Beam profile measurement with luminescent screens of your choice on customized linear or flip feedthroughs.

BEAM STOPPER

The beam stopper is provided to collect accelerated particles and can be mounted on the end of a beam line or on the down-stream flange of a standard diagnostics chamber.

VARIABLE SEGMENTED APERTURE

The variable segmented aperture fits into the entrance ports of vacuum chambers for:

- Beam size limitation
- Rough estimation of beam position

PLASMA TECHNOLOGY

Extensive range of Vacuum Plasma Systems and Supporting Equipment.

RF (Radio Frequency) plasma generators create controlled plasma for applications like semiconductor manufacturing and material processing.

They offer precise ionization control, enabling uniform surface modifications crucial for processes such as thin-film deposition and plasma etching.

DC POWER SUPPLIES

DC power supplies for Sputtering and Plasma generators manufactured by Princeton Scientific are reliable devices for industrial and laboratory deposition, plasma generation, and even dielectric heating and melting. High-voltage power supplies are offered in the 800-120000 V range. An important feature of the high voltage power supplies is the low storage energy in the output stage and their small size.

RF PLASMA GENERATORS

These are reliable devices for industrial and laboratory deposition, plasma generation, and even dielectric heating and melting. This device is also one of the most important components of semiconductor manufacturing systems, used for producing integrated circuits (ICs) and chips present in modern computers and electronic equipment.

MAGNETRON SPUTTERING SOURCES

GT02 and GT20 2" magnetron sputtering sources are designed for precision thin-film deposition in advanced material research and industrial applications.

- Compact Design: Ensures efficient utilization of chamber space while providing optimal target utilization.
- Superior Performance: Engineered for uniform deposition, high target utilization rates, and minimized contamination.
- Versatile Compatibility: Compatible with a wide range of materials, including metals, alloys, and ceramics.
- Robust Construction: Built for durability and consistent performance in high-vacuum environments.

RF PLASMA MATCHING NETWORK

The Automatic Matching Network for RF plasma control changes the RF Generated impedance of the plasma chamber to 50 ohms to reach the maximum power from the generator to the chamber. Princeton Scientific automatic matching networks perform their operation in three independent modes. The automatic mode continuously compensates the impedance variation of the plasma enclosure. The manual mode allows the operator to change the matching capacitance values during the process. In the preset mode, the operator can automatically adjust the capacitance values close to the complete matching condition at the outset so that the matching is performed faster

DESKTOP COATERS

Elevate your research and production processes with our state-of-the-art Desktop Coater, an essential component of our precision vacuum coating system.

Designed for versatility and performance, our desktop coater offers an array of features to meet your coating needs.

SPUTTER COATERS

The Princeton Scientific Desktop Sputter Coater enables thin film sputter coating of noble metals: gold (Au), palladium (Pd), platinum (Pt) and gold/palladium (Au/Pd) on non-conductive or poorly conductive samples or devices.

CARBON COATERS

Our desktop Carbon Coating System compact carbon fibre coating system suitable for sample preparation for the use in Scanning Electron Microscope (SEM), Transmission, Electron Microscope (TEM) and X-Ray analysis (EDX).

TURBO-PUMPED COATERS

We offer a compact and easy-to-use sputter coater, with onboard Turbomolecular Pumping. Use a supplied backing vacuum pump or your own, all controlled with the processor controller.

THERMAL EVAPORATION COATERS

Our Desktop Thermal Evaporator system is used to deposit thin layers of materials on substrates for research purposes and investigation by electron microscopy. DTE is configured as a material evaporator. This low-budget, small chamber, and high-vacuum system is ideal for short time deposition of noble and oxidizing metals

PLD & THERMAL EVAPORATOR SYSTEMS

The versatile Pulsed Laser Deposition and Thermal Evaporator System is a high vacuum thin film deposition system which enables the deposition of different materials by both Pulsed Laser Deposition and Thermal Evaporation technique. It can deposit complex materials and crystalline structures onto substrates with very little setup involved.

VACUUM COATERS FOR GLOVEBOX

The Thermal Evaporation or/and Sputter system is for a vast range of source materials in various forms from wire, cord, pellets and powders, compatible with Boat/basket and coil source holders. Glovebox compatible, it comes with remote control, and a motorized chamber lift mechanism.

PRINCETON SCIENTIFIC CORPORATION

Certified SBA WOSB Woman Owned Small Business

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