



PRINCETON SCIENTIFIC

C O R P O R A T I O N

**Solutions *for* Research,
Development & Production**



ADVANCED MATERIALS

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

- Metal Single Crystals & Bicrystals
- Highest Purity Materials
- Oxide Single Crystals
- Evaporation Materials
- Thin Film Materials
 - Sputtering Targets
 - Backing Plates
 - Bonding
- Optical Materials
 - Fluorides (BaF₂, CaF₂, LiF, MgF₂)
 - Chlorides (AgCl, NaCl, KCl, KBr)
 - Infrared (ZnSe, ZnS, Ge, Si)
 - Monocrystalline: Sapphire, Quartz
 - Undoped Garnets: YAG, GGG
- III-V Materials
- Re-polishing & orienting of customer's samples



NLO/LASER CRYSTALS

- 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
- YAP Crystals: Er:YAP, Nd:YAP, Tm:YAP
- Other: Alexandrite, Ti:Sapphire, Forsterite, Nd:YVO₄, Diffusion bonded crystals



PLASMA TECHNOLOGY

We offer a wide range of products from low-cost laboratory plasma cleaners to custom plasma treatment systems for academia and industry.

- Plasma cleaning treatments
- Plasma surface activation treatments for improved adhesion
- Plasma coatings – hydrophilic and hydrophobic treatments
- Low pressure benchtop plasma systems
- Large capacity advanced plasma systems
- Microscopy plasma systems
- Atmospheric plasma treatment
- Surface testing equipment

PRECISION WIRE SAWS

- Can cut semiconductors, ferrites, metals, glasses and other hard or brittle solids. Cut samples 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 20µm to 60µm
- No "wandering" of cutting wire in an unintended direction
- Cut under any desired angle feasible
- Cut samples up to a size of 80x80x150mm
- Semi-automatic, requires no supervision

PARTICLE BEAM LINE

We supply products and services to the accelerator scientific community.

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

About Princeton Scientific Corporation

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



MATERIALS



**PLASMA
TECHNOLOGY**



**PRECISION
WIRE SAWS**



**PARTICLE
BEAM LINE**



**UHV
TECHNOLOGY**



**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 Wire Saws, Diamond Wire Saws, Particle Beam Line & Diagnostics, UHV Technology, Plasma Systems.

Princeton Scientific Corp. now offers:

- ▶ Diamond Wire Saws
- ▶ Particle Beam Line & Diagnostics
- ▶ Plasma Systems
- ▶ UHV Instruments/Components

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 deposition process. Our sputter targets are prepared either by a melt or powder metallurgical process.

We also provide an array of backing plates for your system's requirements, and our bonding services include various metallic or silver epoxy techniques.

BORIDES CARBIDES FLUORIDES NITRIDES SILICIDES

CrB ₂	B ₄ C	AlF ₃	AlN	CrSi ₂
HfB ₂	Cr ₃ C ₂	BaF ₂	BN	Cr ₃ Si
LaB ₆	HfC	CaF ₂	HfN	HfSi ₂
Mo ₂ B ₆	Mo ₂ C	CeF ₃	NbN	MoSi ₂
NbB ₂	NbC	LaF ₃	Si ₃ N ₄	NbSi ₂
TaB ₂	SiC	PbF ₂	TaN	PtSi
TiB ₂	TaC	LiF	TiN	TaSi ₂
WB	TiC	MgF ₂	VN	Ta ₅ Si ₃
W ₂ B	WC	KF	ZrN	TiSi ₂
VB ₂	WC 6%Co	Re/NaF	and others	Ti ₅ Si ₃
ZrB ₂	WC 12%Co	Na ₃ AlF ₆		WSi ₂
and others	VC	ThF ₄		VSi ₂
	ZrC	YF ₃		V ₃ Si
	and others	and others		ZrSi ₂
				and others

SULFIDES, SELENIDES, TELLURIDES

As ₂ S ₃	PbS	NbSe ₂	TaTe ₂	ZnS
CdSe	PbTe	Nb-S	WSe ₂	ZnTe
CdS	MoSe ₂	NbTe ₂	WS ₂	and others
CdTe	MoS ₂	TaSe ₂	WTe ₂	
PbSe	MoTe ₂	TaS ₂	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
	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/SiO ₂ 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/Y
Au/Ir	Co/Nb/Zr	PFe/Si/B/C	Pd/Pt	And others

OXIDES

Al ₂ O ₃	CuO	PbZrO ₃	Supercond.	Y ₂ O ₃
Sb ₂ O ₃	HfO ₂ unstab.	LiNbO ₃	SrO	ZnO
BaTiO ₃	HfO ₂ /CaO	MgO	SrTiO ₃	ZnO dop.
Bi ₂ O ₃	HfO ₂ /Y ₂ O ₃	MoO ₃	SrZrO ₃	ZrO ₂ unstab.
Bi ₂ TiO ₅	In ₂ O ₃	Nb ₂ O ₃	Ta ₂ O ₅	ZrO ₂ /CaO
Bi ₄ Ti ₃ O ₁₂	ITO	Nb ₂ O ₅	ThO ₂	ZrO ₂ /Y ₂ O ₃
BiTiO ₃	LaAlO ₃	Re ₂ O ₃	SnO ₂	and others
CeO ₂	La ₂ O ₃	SiO ₂	TiO ₂	
CrO ₃	PbTiO ₃	SiO	WO ₃	

Backing Plates

Backing plates are available in the following materials:

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

Metal 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 highest purity starting materials are used.

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 $<0.05^\circ$.

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 $<1\text{nm}$ (also with soft elements like Au or Pb).

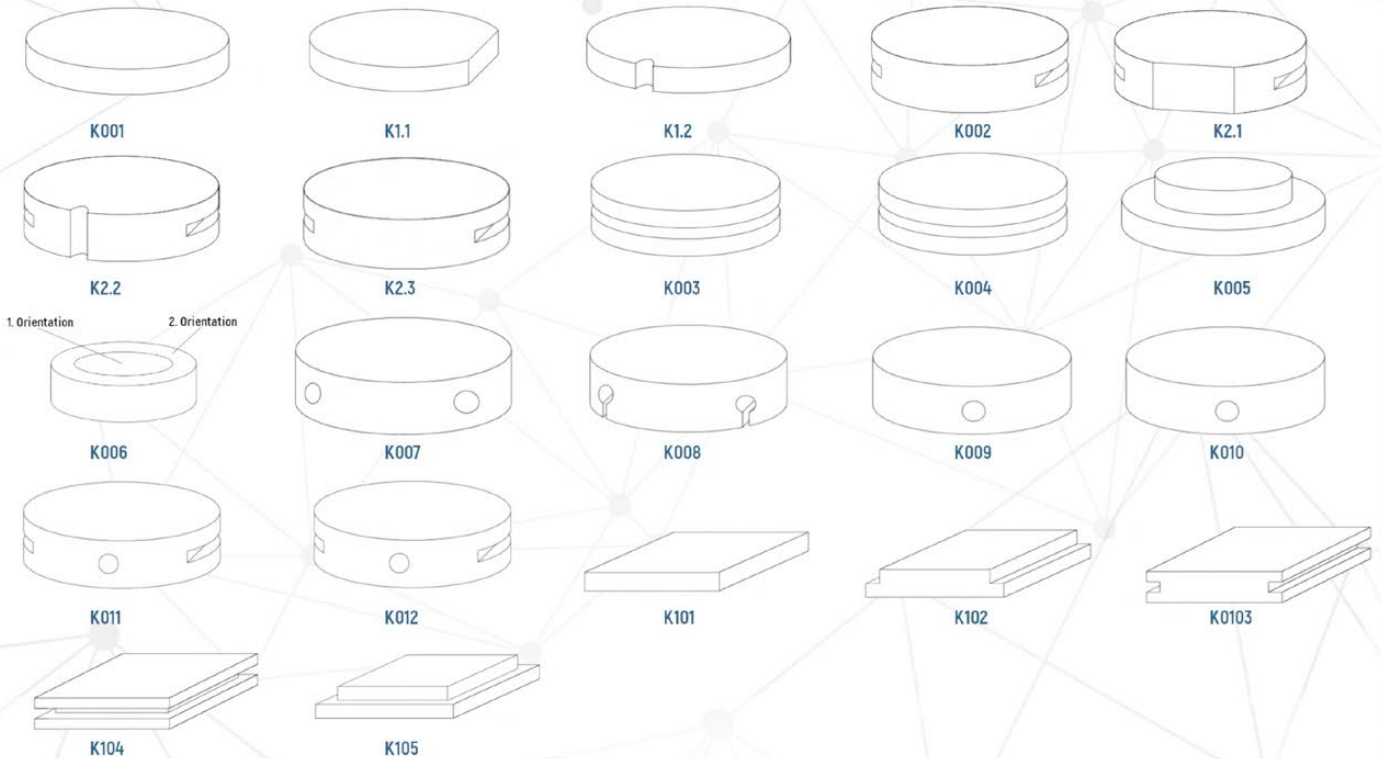
Geometric: Several geometries are available. See our website for all geometries we offer. When requesting a quote, please specify geometric shape. In case the desired geometrics are no available on our website, please send us a drawing for a quote.

13 26.9815 Al Aluminum	51 121.75 Sb Antimony	83 208.980 Bi Bismuth	48 112.40 Cd Cadmium	24 51.996 Cr Chromium	27 58.933 Co Cobalt	29 63.54 Cu Copper	66 162.50 Dy Dysprosium
64 157.25 Gd Gadolinium	32 72.59 Ge Germanium	79 196.967 Au Gold	72 178.49 Hf Hafnium	67 164.930 Ho Holmium	49 114.82 In Indium	77 192.2 Ir Iridium	26 55.847 Fe Iron
82 207.19 Pb Lead	3 6.939 Li Lithium	12 24.312 Mg Magnesium	42 95.94 Mo Molybdenum	28 58.71 Ni Nickel	41 92.906 Nb Niobium	46 106.4 Pd Palladium	78 195.09 Pt Platinum
75 186.2 Re Rhenium	45 102.905 Rh Rhodium	44 101.07 Ru Ruthenium	14 28.086 Si Silicon	47 107.870 Ag Silver	73 180.948 Ta Tantalum	52 127.60 Te Tellurium	50 118.69 Sn Tin
22 47.90 Ti Titanium	74 183.85 W Tungsten	73 50.942 V Vanadium	39 88.905 Y Yttrium	30 65.37 Zn Zinc	40 91.22 Zr Zirconium		

Metal Crystals

Available Geometries

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



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
- ▶ Bonding & de-bonding of sputtering targets
- ▶ Complete coating services

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 99.99999%. Evaporation material can be made to order in the following forms:

- ▶ Chunk
- ▶ Rod
- ▶ Source
- ▶ Foil
- ▶ Shot
- ▶ Tablet
- ▶ Pellet
- ▶ Slug
- ▶ Granules
- ▶ Wire
- ▶ Starter
- ▶ Pieces

EVAPORATION MATERIALS

Al	CaF2	Eu	La2O3	Ni2B	Na2CO3	TiSi2
AlSb	CaH2	Eu2O3	(La0.7Sr0.3)MnO3	NiSi2	NaCl	W
AlB2	CaO	Gd	LaTiO3	NiO	NaF	WC
AlF3	CaS	Gd2F3	Pb	NiTe	Na2O2	WO3
Al2O3	CaTiO3	Gd3Ga5O12	PbO	Nb	Sr	WSe2
AlP	Ca3(PO4)2	Ga	PbTe	NbC	SrCO3	WSi2
Sb	Ca10(OH)2(PO4)6	GaSb	Li	Nb2O5	SrF2	WS2
Sb2S3	C	GaAs	Li2CO3	NbO2	SrMoO4	WTe2
Sb2O3	Ce	GaN	Li2CO3	NbSe2	SrO	V
Sb2Te3	CeB6	Ga2O3	LiF	Os	SrRuO3	VC
As	CeF3	Ge	LiMn2O4	Pd	SrS	VO2
As2O3	CeO2	Ge3N4	LiNbO3	PdO	SrTiO3	VN
As2Te3	CsF	GeO2	Li2O	P	SrZrO3	V2O3
BST	CsI	GeSe2	Li3PO4	P2O5	S	V2O5
BaS	Cr	GeS	Lu	Pt	Ta	VSe2
BaZrO3	CrO3	GeTe	Lu2O3	KNbO3	TaC	V2S3
Ba	CrB2	Au	Mg	Pr	TaN	Yb
BaFe12O19	Cr3C2	Hf	MgAl2O4	Pr2O3	Ta2O5	YbF3
BaF2	CrF3	HfC	MgB2	Re	TaSe2	Yb2O3
BaO	Cr2N	HfO2	MgF2	Rh	TaSi2	Y
BaO2	Cr2O3	Ho	MgO	Rh2O3	Te	Y3Al5O12
BaTiO(3)	CrSi2	Ho2O3	Mg2Si	Ru	TeO2	Y3Fe5O12
Bi	Cr2S3	In	MgS	RuO2	Tb	YF3
Bi2O3	Co	In2Te3	Mn	Sm	TbF3	Y2O3
Bi2S3	CoFe2O4	InSb	MnO	SmF3	TbOF	Zn
Bi2Te3	CoO	InN	MnO2	Sm2O3	Tb4O7	ZnF2
Bi4Ti3O12	Co3O4	In2O3	Mn2O3	Sc	Sn	Zn3N2
B	CoSi2	In2O3/SnO2	MnTe	Sc2O3	SnF2	ZnO
B4C	Cu	Ir	HgTe	Se	SnO2	Zn3P2
BN	CuS	IrO2	Mo	SeO2	SnS2	ZnSe
B2O3	Cu2O	Fe	MoB	Si	SnTe	ZnS
Cd	CuO	FeB	Mo2C	SiC	Ti	ZnTe
Cd3As2	Cu3P	Fe3C	MoS2	SiO2	Ti3Al	Zr
CdCl2	CuSe	NiFe2O4	MoO3	SiO	TiB2	ZrB2
CdF2	Cu2S	Fe2O3	MoO2	Si3N4	TiC	ZrC
CdO	Dy	Fe3O4	MoSe2	SiS2	TiO2	ZrCl4
CdSe	DyF3	FeSi2	MoSi2	Ag	TiF3	ZrF4
Cd2SnO4	Dy2O3	FeS2	MoTe2	AgCl	TiO	ZrN
CdS	Er	La	Nd	Ag2O	TiN	ZrO2
CdTe	ErF3	LaAlO3	Nd2O3	Na	Ti2O3	ZrSi2
Ca	Er2O3	LaB6	Ni	Na5Al3F14	TiSe2	ZrO2/Y2O3



Laser Crystals

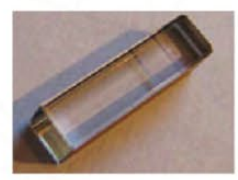


We offer common host crystals such as YAG (Yttrium Aluminum Garnet) or YVO4 (Yttrium Orthovanadate) with various dopants such as Neodymium, Ytterbium, Erbium and Chromium. The ready to use coated or uncoated laser rods are manufactured to the highest standards of our crystal technology. All of the LASER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

NLO CRYSTALS

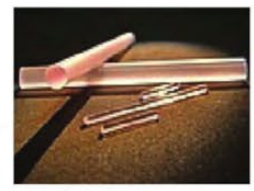
LBO
BBO
KTP
GTR-KTP
RTP
KTA



KTA
Bi8306
LiNbO3
MgO:LiNbO3
KD*P & KDP
LiIO3

LASER CRYSTALS

Nd:YVO4
Nd:GdVO4
Nd:YAG
Cr4+:YAG
Ho:Cr:Tm:YAG
Nd:Ce:YAG
Yb:YAG
Er:YAG
Ce:YAG
Ti:Sapphire
Nd:GGG



Nd:YLF
Tm:YLF
Ho:YLF
Nd:KGW
Yb:KGW
Er:YAP
Nd:YAP
Forsterite
Alexandrite
Er:Cr:YSGG
Diffusion Bonded Crystals

ACOUSTO-OPTIC CRYSTALS AND ELECTRO-OPTIC CRYSTALS

LiTaO3

LiNbO3

BIREFRINGENT CRYSTALS

YVO4
a-BBO

LiNbO3

SCINTILLATION CRYSTALS

CsI
LaBr3(Ce)

YAG (Ce)

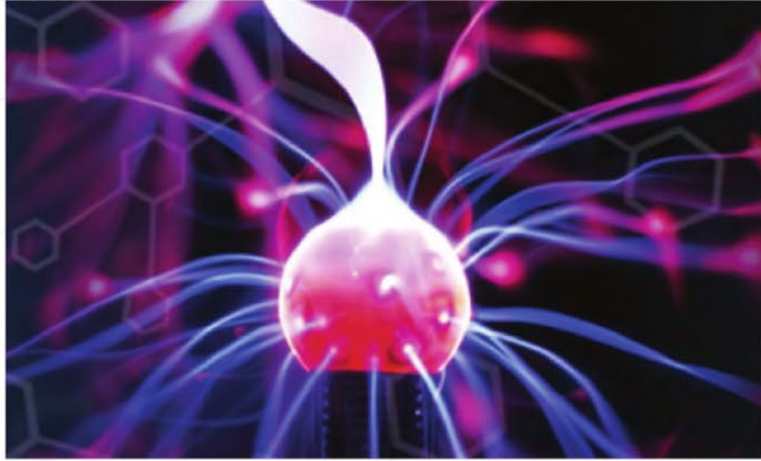
Nal (TI)
LaCl3(Ce)

MAGNETO-OPTICAL CRYSTALS

TGG

TSAG

Plasma Technology



Plasma technology has been an important production tool for many decades. One example is in the fabrication of microelectronic devices. Over this period, plasma technology has also become invaluable in many other areas of industry including automotive, medical devices, textiles and aerospace.

We offer a wide range of products from low-cost laboratory plasma cleaners to custom plasma treatment systems for academia and industry.



- Plasma cleaning treatments
- Plasma surface activation treatments for improved adhesion
- Plasma coatings - hydrophilic and hydrophobic treatments
- Low pressure benchtop plasma systems
- Large capacity advanced plasma systems
- Microscopy plasma systems
- Atmospheric plasma treatment
- Surface testing equipment

What is plasma treatment & what can plasma treatment do?

Plasma treatment is used to clean and activate surfaces to improve their adhesion characteristics. Plasma cleaning removes trace organic contamination from the surface, which would otherwise prevent good adhesion. At the same time, plasma treatment activates the surface and turns it from a low to a high surface energy state so that it becomes easily wettable by adhesives, paint, glue etc. Plasma treatment solves problems of poor adhesion in many industries.

Microscopy Plasma Cleaners

Our plasma cleaners for microscopy applications are low-cost benchtop systems designed specifically for fast and efficient cleaning of TEM sample holders as well as SEM stubs. The TEM plasma cleaner is fully automated and comes with standard adapters which are suitable for the sample holders supplied from all the major microscope manufacturers. The plasma output power is fully variable over the range 0-100W, resulting in a very controllable & gentle cleaning process.

The TEM plasma cleaner is an application specific solution for low-pressure plasma cleaning and preparation of electron microscopy samples, including:

- ▶ Low power operation
- ▶ Front feed of TEM sample holder
- ▶ Multiple TEM grids and SEM stub cleaning
- ▶ Re-entrant style sample holder introduction
- ▶ Dual gas inlets for O₂/Ar and other gases



MICROSCOPY PLASMA CLEANERS

HPT-100 TEM Plasma Cleaner: 100mm diameter cylindrical chamber (2 litre volume) with TEM holder adapters and removable parts tray.

HPT - Low Pressure Plasma Treatment

Our 'HPT' range of low-pressure plasma treatment systems are microprocessor-controlled benchtop devices that are ideal for routine laboratory, R&D, and light industrial tasks. Due to their ease of use and reliability, they are the instrument of choice for many of the world's leading companies and institutes, where they are used to clean surfaces and activate materials in order to increase wettability and improve adhesion. Our HPT plasma systems are perfect for surface cleaning, surface preparation, and surface modification of a wide range of materials including metals, glass, polymers, ceramics, plastics, and composites. Key applications include composites joining development, microfluidics PDMS bonding, microscope sample cleaning, optics cleaning, metals cleaning, biomedical applications, polymer science, and medical device manufacture.

HPT LOW PRESSURE PLASMA SYSTEMS

HPT-100: 100mm diameter cylindrical chamber (2 litre volume)

HPT-200: 150mm diameter cylindrical chamber (5 litre volume)

HPT-300: 200mm x 200mm rectangular chamber (12.5 litre volume), multiple parts trays

HPT-500: 240mm x 240mm rectangular chamber (23 litre volume), multiple parts trays



Atmospheric Plasma Treatment



The Cirrus atmospheric plasma device improves the adhesion characteristics of a wide range of materials.

It is a compact standalone instrument which delivers a continuous plume (8-10mm wide) of low temperature plasma to the surface and can easily be integrated with assembly/production lines with or without robot handling. The Cirrus operates with compressed air and doesn't require any special gases or other services. A rear panel sub-D connector allows start/stop triggering of the plasma via an external signal supplied by the line.

The Nimbus atmospheric plasma device is the dual nozzle version of the Cirrus atmospheric plasma device. Plasma zones can be applied to different areas or overlapped to cover wider areas.

Atmospheric plasma cleaning & activation of:

- Polymers
- Metal
- Ceramics
- Glass
- Composites

Atmospheric plasma advantages:

- Fast localized atmospheric plasma pre-treatment of parts prior to bonding
- Ultrafine atmospheric plasma cleaning
- Surface activation with atmospheric plasma
- Highest quality treatments
- Very low operation cost & easy integration with automated lines

ATMOSPHERIC PLASMA TREATMENT:

Atmospheric Plasma System: Cirrus and Nimbus, single and dual nozzle versions

Nebula - Low Pressure Plasma Treatment



Our 'NEBULA' range of low-pressure plasma treatment systems are standalone systems with large capacity chambers for treating larger format parts, or more parts in a single batch.



They are suited to both regular industrial usage and also for development of new processes and surface chemistry. NEBULA plasma treatment systems have a large HMI interface and are controlled via an industrial PLC system. They allow user level access ranging from simple operator, able to execute programs only, to full administrator, able to create users, edit, and test new recipes. Due to their flexibility and robustness, they are chosen where reliability and flexibility are paramount.

Each NEBULA system can be configured with a variety of options including horizontal and vertical sample loading and also a rotary drum for treating many small parts or even powders. The user can specify up to three gas inlets as well as a precise monomer dosing inlet for plasma polymerization work. In this way, simple cleaning and activation tasks can be extended to produce permanent polymeric coatings on many surfaces.

Our NEBULA range of low-pressure plasma treatment systems are perfect for cleaning, activation, and deposition of a wide range of materials. Key applications include surface preparation to improve bond adhesion and plasma polymerization to produce hydrophilic or hydrophobic coatings.

NEBULA LOW PRESSURE PLASMA SYSTEMS:

NEBULA-30: 30 litre plasma processing chamber (300x300mm x 375mm D)

NEBULA-50: 50 litre plasma processing chamber (300x300mm x 600mm D)

NEBULA-100: 100 litre plasma processing chamber (400x400mm x 600mm D)

NEBULA-150: 150 litre plasma processing chamber (400x600mm x 600mm D)

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. As a result:

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

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 μ m, with smooth cut surfaces where the roughness does not exceed 1 μ m. With a goniometer mounted to the saw, very precise orientations of crystal surfaces are possible before the cutting process begins.

NEW

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.



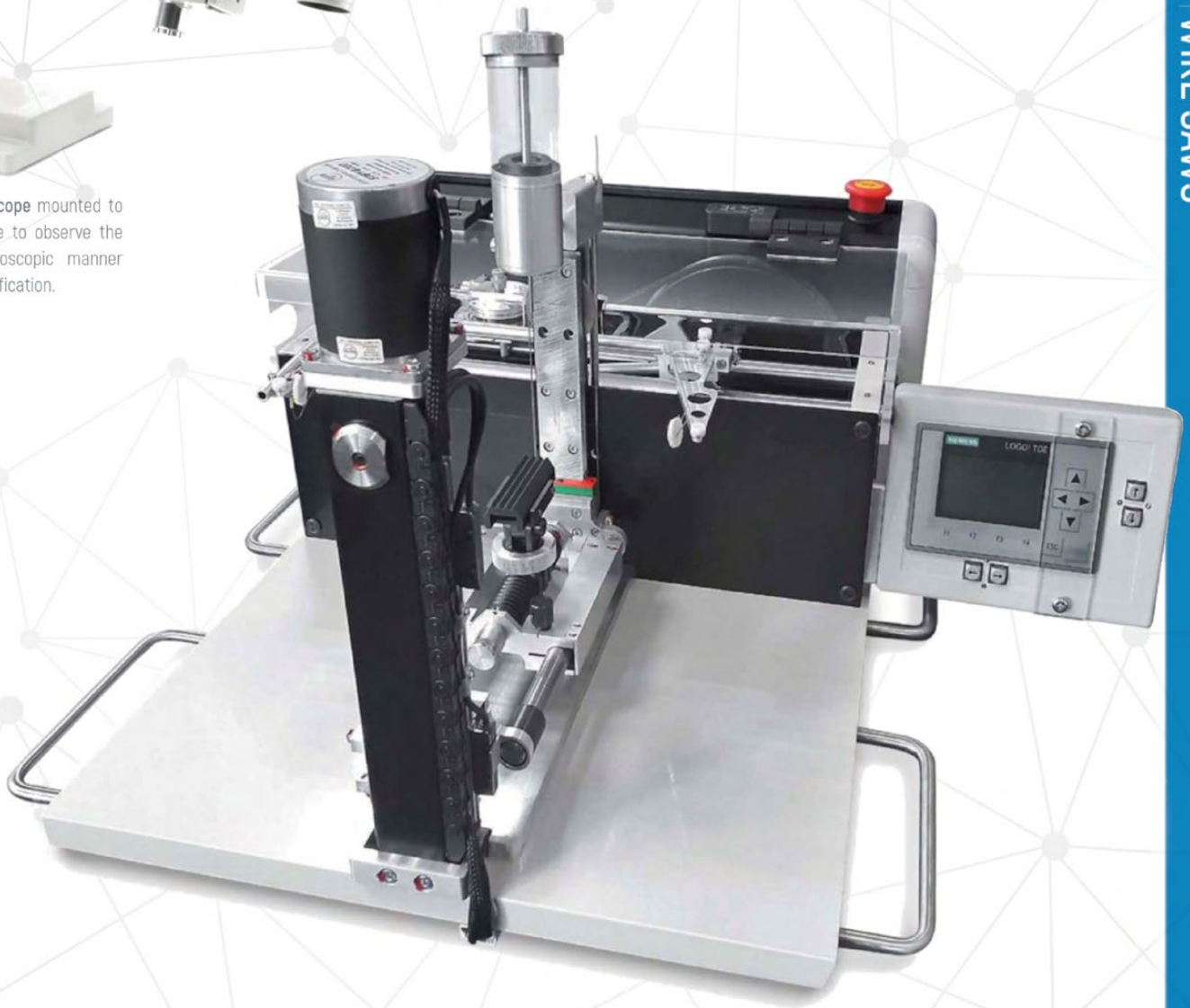
These two requirements have been met by the development of an improved cutting technique which utilizes the precision guidance of the wire and uniform application of an abrasive slurry. The WS-25 wire saw is a semi-automatic machine and requires no supervision during its operation. The wire saw can be 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 10 μ m) with smooth cut surfaces (where surface roughness does not exceed 1 μ m).

VISIT OUR WEBSITE FOR OUR OTHER WIRE SAW MODELS
www.PrincetonScientific.com

Precision Wire Saw WS 25B



With a Stereo Microscope mounted to the saw, it is possible to observe the samples in a stereoscopic manner with adjustable magnification.



ADVANTAGES

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

TECHNICAL DATA

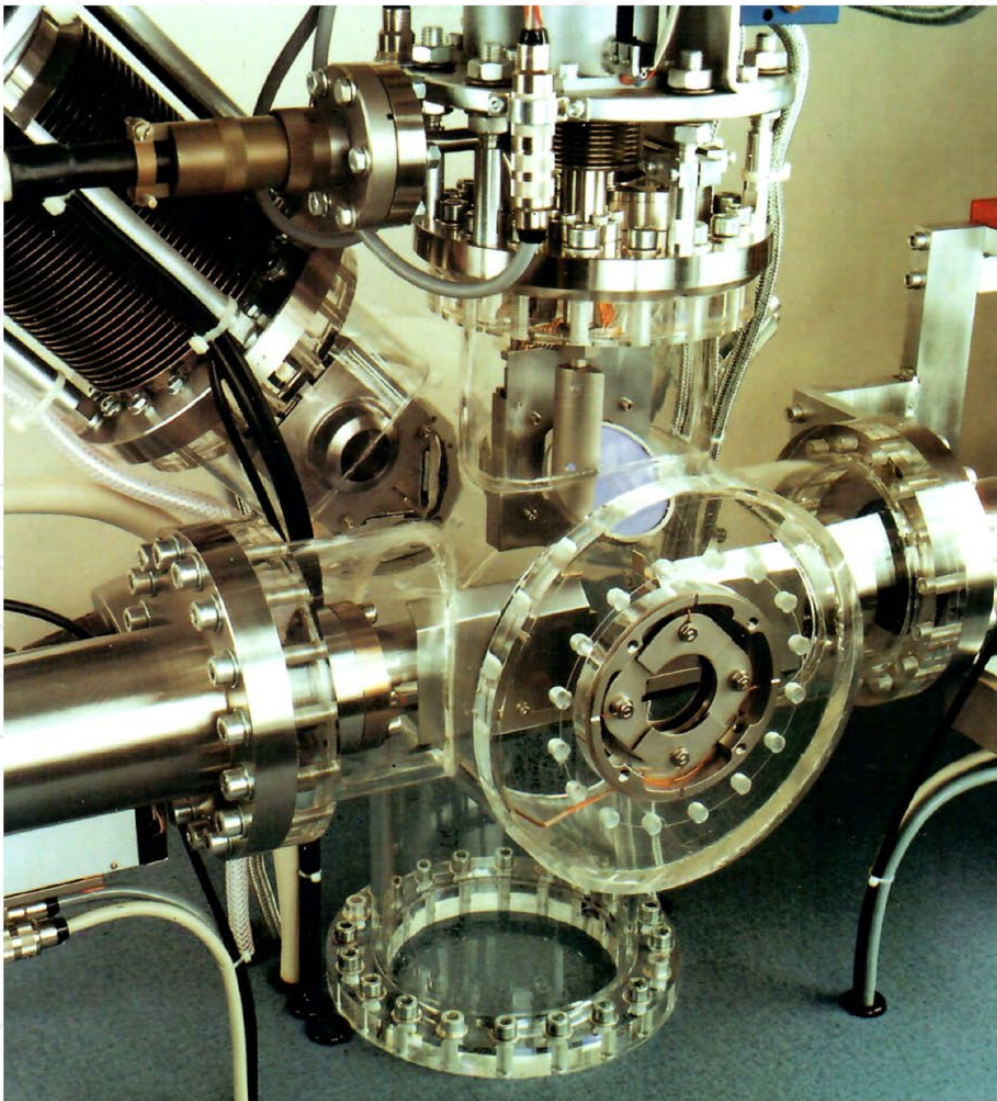
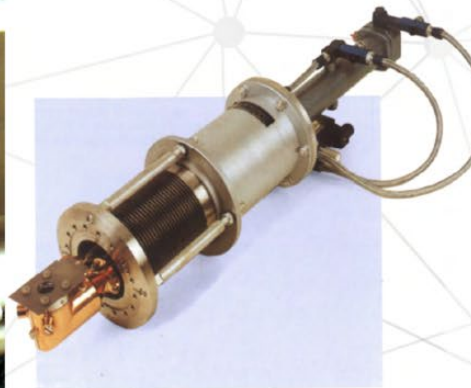
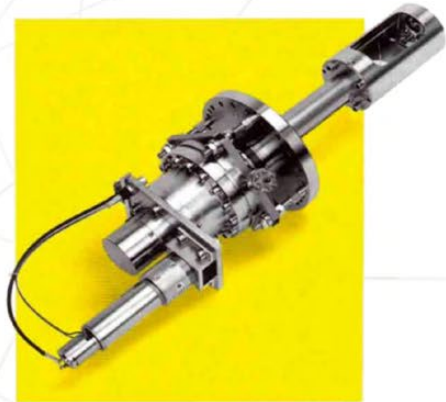
- ▶ Sample max dimensions: 80 x 80 mm
- ▶ Power Supply: 220-250 V/50 Hz or 110 V/60 Hz
- ▶ Tungsten wire diameter: 20-60 μm
- ▶ Diamond dotted wire: 100-300 μm
- ▶ Wire oscillation frequency: 150-200/min
- ▶ Weight: 68 kg
- ▶ Dimensions: 630 x 720 x 250 mm

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 many 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 Chambers
- ▶ High Vacuum Feedthroughs
- ▶ Metal-Ceramic Bonds
- ▶ Beam Profile Measuring System
- ▶ Emittance Measurement Device
- ▶ Beam Stopper
- ▶ Faraday Cups
- ▶ RFQ Accelerator Structures
- ▶ Variable Segmented Aperture
- ▶ Capacitive Pick-Up Probes
- ▶ Jaw Slit Systems
- ▶ Rotating Wire Scanner



Particle Beam Line



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.



BEAM DIAGNOSTICS

We provide an extensive range of solutions, where customization is our standard practice

- ▶ Faraday Cups
- ▶ Beam Profile Monitors
- ▶ Capacitive Pick-Up Probes
- ▶ Emittance Scanners



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



RFQ ACCELERATOR STRUCTURES

Various RFQ structures of the 4-rod type.

- ▶ Design and manufacturing of RF-systems
- ▶ Design and manufacturing of vacuum systems
- ▶ Delivery of a control system via PC or VME

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 e.g. beam size limitation or rough estimation of beam position.



HIGH VACUUM FEEDTHROUGHS

Universal precision high vacuum feedthrough with an accuracy of positioning of +0.03mm (single or twin version)



JAW SLIT SYSTEMS

Jaw slit systems available (with UHV-Feedthrough, Type LM 17) are used for beam size limitation, beam analysis functions, and energy definition in beam transport systems of particle accelerators.

METAL-CERAMIC BONDS

Ceramic chambers are widely used in accelerator units for injection, fast extraction and beam excitation.



ROTATING WIRE SCANNER

For measurement of beam intensity profiles versus transverse coordinates.



UHV Technology

MANIPULATORS, DRIVES & MOTIONS

- Manipulators
 - Single Bellows
 - Dual Bellows
 - Sample Holders
 - Sample Heating
 - Motor Controllers
 - XY Modules
- Drives and Motions
 - UHV Linear Drives
 - Rotary Drives
 - Wobble Sticks
 - Magnetic Transfer Probes
 - Non-magnetic Transfer Probes
 - Rotary Platforms
 - Z Axis Linear Transfer



CHAMBERS, UHV VALVES & ACCESSORIES

- UHV Chambers Manufacturing
- UHV Leak Valves
- UHV Right Angle Valves
- Valve Accessories
- 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
- Triaxial Feedthroughs
- Fibre Optics
- Kapton Wires and Accessories
- Safety Components
- Gauges
- Viewport Accessories
- Special Custom Built Vacuum Equipment



Diamond Wire Saws

||| Saw 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)

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 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 continuously adjustable wire speed goes from 0 to 4 m/s. To ensure a constant cutting pressure, the feed is done by gravity. Workpieces can be cut both wet and dry.

∞ 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.250E



The diamond wire saw **DWS.250E** (endless) is a one-way table saw in vertical design.

The maximum workpiece cutting area is 250x250 mm. Diamond wire loops with a length of 2000 mm and thicknesses from 0.35 to 0.60 mm are used.

The continuously adjustable wire speed goes from 4 to 12 m/s. To ensure a constant cutting pressure, the feed is done by gravity. Workpieces can be cut both wet and dry.

DWS.175 and DWS.250



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.

The **DWS.250** type diamond wire saw is currently our largest 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 continuously adjustable wire speed goes from 0 to 4 m/s. To ensure a constant cutting pressure, the feed is done by gravity. Workpieces can be cut both wet and dry.

DWS.375E



The diamond wire saw **DWS.375E** (endless) is currently our largest one-way saw in vertical design.

The maximum workpiece cutting area is 375xH375 mm. Diamond wire loops with a length of 3000 mm and thicknesses from 0.35 to 0.80 mm are used.

The continuously adjustable wire speed goes from 4 to 12 m/s. To ensure a constant cutting pressure, the feed is done by gravity. Workpieces can be cut both wet and dry.

PRINCETON SCIENTIFIC

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