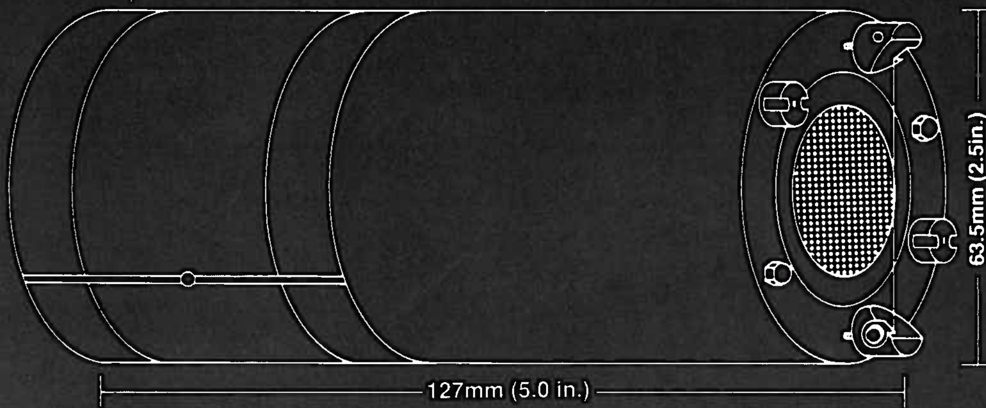
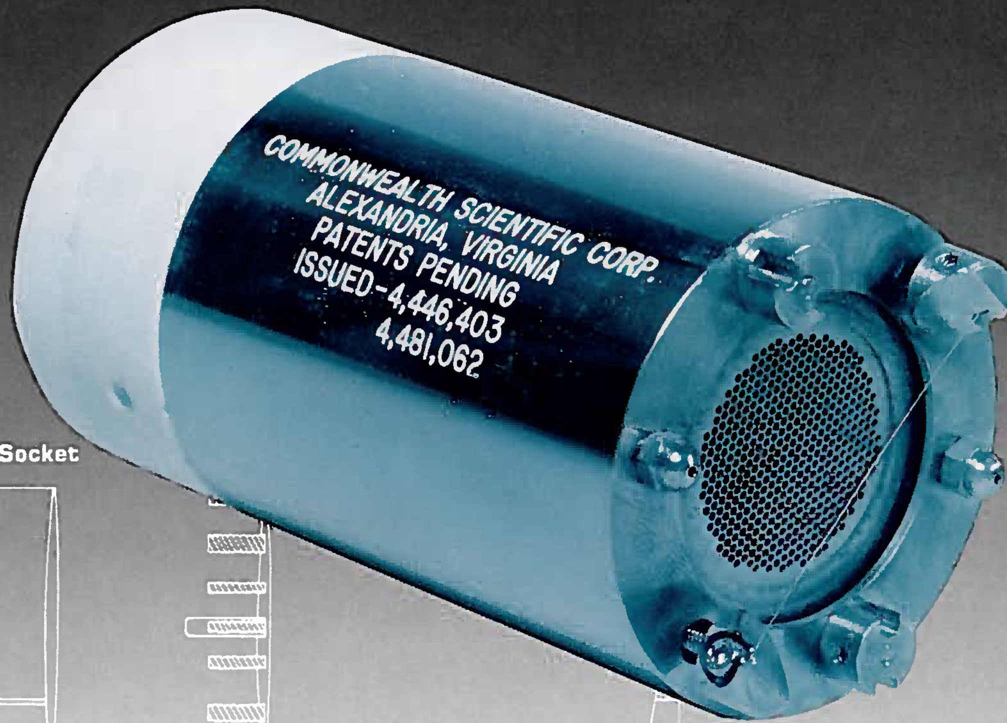
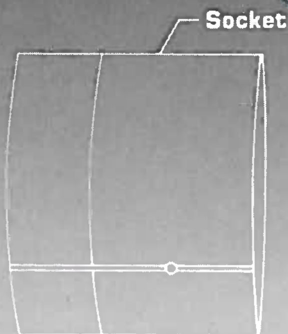
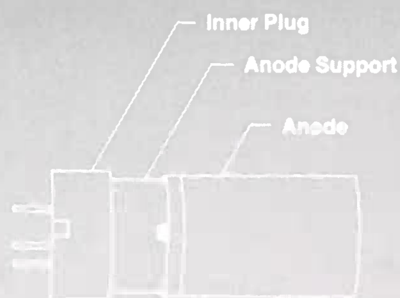
COMMONWEALTH SCIENTIFIC CORPORATION

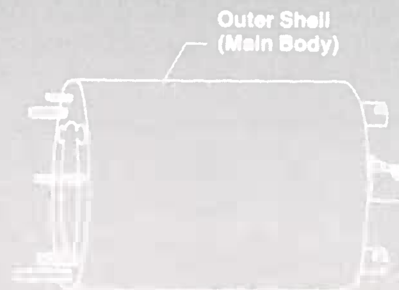
3cm BROAD BEAM ION SOURCE





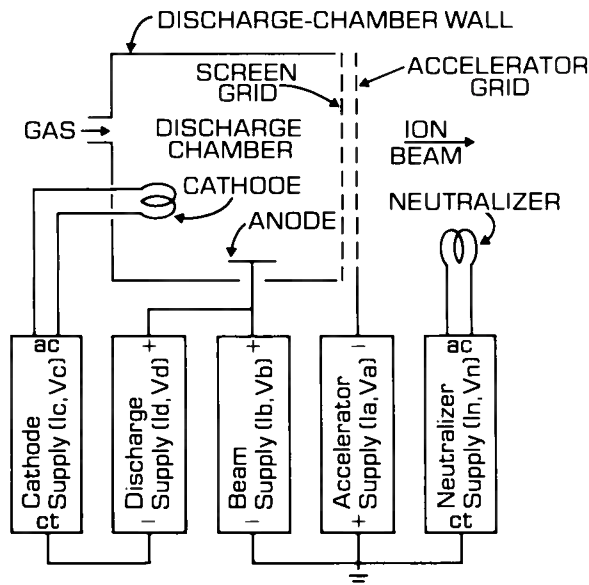






3cm ION SOURCE

BROAD BEAM ION SOURCE



Broad beam ion sources are used in a variety of research and production applications, most of which involve surface modification, as in sputter etching or deposition. A neutralized ion beam is generated with the ion energy, direction, and current density all independently controllable and all independent of the type of target used. The neutral pressure in the vicinity of the ion beam is also, to a large extent independently controllable. These advantages are associated with the isolation of the ion production and acceleration from the target and/or substrate. This isolation is formed to a greater degree in the broad beam ion source than in competing plasma devices.

Working Theory

1. Working gas is introduced into the discharge chamber.
2. Cathode emits ion producing electrons.
3. Screen grid forms ions into beamlets.
4. Negative accelerator grid attracts beamlets and forms the ion beam.
5. Neutralizer emits charge balancing electrons.

UNIQUE 3cm SERVICING DESIGN

1. Turn (2) screws with key until free of threads.
2. Disengage source cover from socket back and remove from chamber.

3. Slide anode assembly out of source cover.
4. Loosen (2) allen screws inside anode assembly and rotate anode 90° before lifting off.

5. Loosen cathode filament mounting screws to remove old filament and insert new one.
6. Repeat above steps in reverse to reassemble.

NOTE:

Optics remain as a package and are not realigned or disassembled for filament changes or source cleaning. Socket back, electrical and gas lines into the socket remain fixed in the chamber throughout the procedure.

TECHNICAL DESCRIPTION

Source construction is predominantly stainless steel with graphite optics and high temperature ceramic socket pieces. This construction allows for reactive gas work, mounting in UHV systems and baking cycle tolerance. The cover sufficiently overlaps the grid mounting to prevent backsputter or evaporant from coating any electrical connections. Because the discharge chamber wall is continuous we have little workpiece contamination from the discharge chamber. This design also permits rapid and convenient cleaning when insulating layers are deposited in the source. Our discharge chamber has the additional advantage of operating at very low voltages. Effective discharge can be maintained at chamber pressures of 1×10^{-4} torr in a 500 liter/sec vacuum pumping system. Argon gas flow is normally in the 5 sccm range.(Ion Source Patents: #4,481,062 and #4,446,403, others pending.)

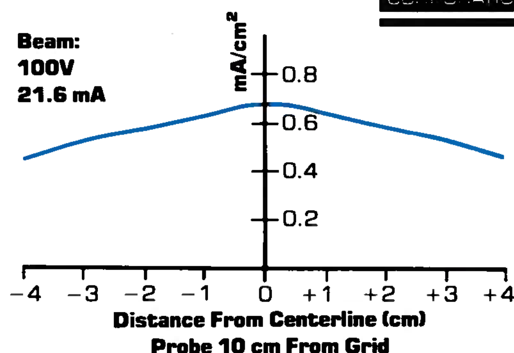
The 3cm Ion Source utilizes advanced concepts of state-of-the-art switching type power supplies. These supplies feature high-efficiency, reflected in a compact layout in a 19" rack mount unit. Individual supplies are edge connected allowing quick removal for servicing. The beam voltage and current parameters can be operated in the manual or automatic mode. Both filament supplies have a soft-start feature. All front panel adjustments are made with multi-turn controls. Front panel rocker switches enable digital display of all the beam parameters.

CS CORPORATION

▲ APPLICATIONS AND PROFILES

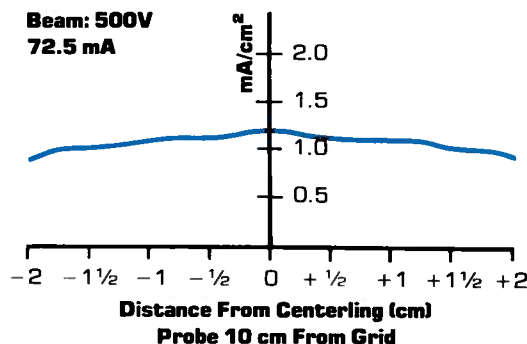
Precleaning

Ion Milling aids in the cleaning of substrates prior to thin film coating. Contaminants (adsorbed oxide layers) can be milled away by low-energy ion bombardment. Preceding thin film deposition with a precleaning period results in enhanced adhesion of the film and improved stoichiometry.



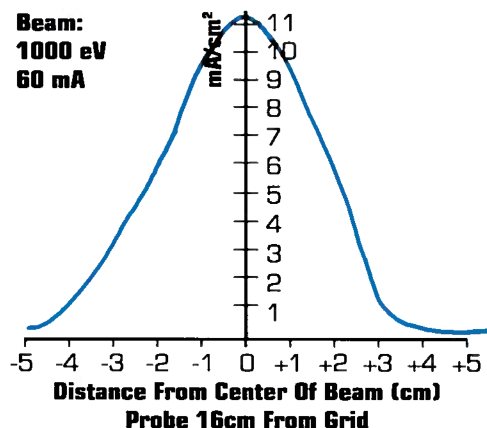
Etching

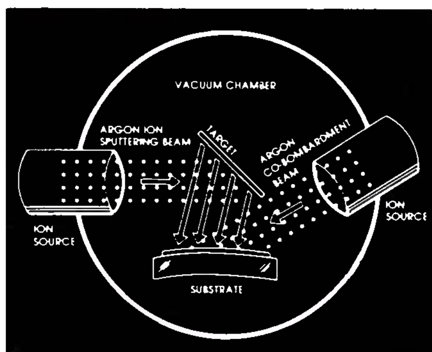
Collimated or Defocused Grid Optics This technique involves the ejection of atoms from the surface of the material as a result of variable angle bombardment by a beam of energetic ions. Reactive gases can be used to achieve the selectivity of plasma etching with the high degree of anisotropy associated with a physical etching process.



Deposition

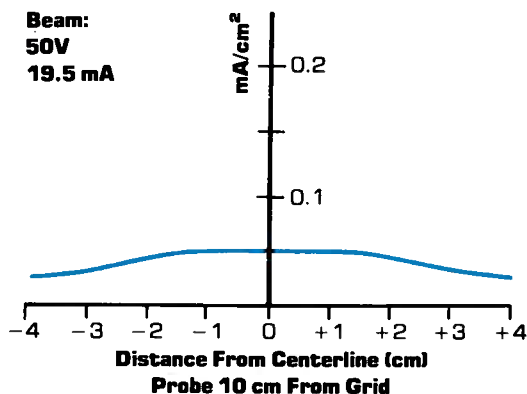
Focused Grid Optics Uniquely adherent thin films of practically any material (metals, semi-conductors, insulators, compounds, alloys and plastics) can be deposited with different material combinations. Ion beam precleaning of both target and substrate before deposition yields high purity films.





Ion Assisted Deposition

Interjecting a low energy ion beam onto a surface that is simultaneously receiving ionic or evaporative deposition creates unique films with tailored characteristics. Controlled ion energy levels can selectively etch undesirable loose bonded deposition, leaving the more tightly bonded materials.

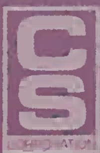


IBS Power Supply in system rack

IBS SERIES POWER SUPPLIES

Features Include:

- sequential Operation of up to 100 recipes with timers for counting up or down
- continuous display of 7 operating parameters plus error message
- serviceable from front or rear of unit while in rack
- internal power-up checking of all supplies
- fault location and error reports
- operational checking of power supply functions with LED and message status
- remote modem interface to service center
- rugged; short fault protection for internal or external shorts



POWER SUPPLY SPECIFICATIONS

	IBS250	IBS600	IBS1200	MKI	MKII	MKIII	RF	Linear 20-100
Input Voltage	208/220/ 250	208/220/ 240	208/220/ 240	208/220/ 240	208/220/ 240	208/220/ 240	208/220/ 240	208/220/ 240
Input Current	10A	20A	20A	10A	20A	20A	20A	20A
Freq. AC	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz	50/60 Hz
Remote On/Off	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Computer interface	RS232	RS232	RS232	Optional	Optional	Optional	RS232	Optional
Modes	Manual/ Auto/ Remote	Manual/ Auto/ Remote	Manual/ Auto/ Remote	Manual/ Remote Optional	Manual/ Remote Optional	Manual/ Remote Optional	Manual/ Auto/ Remote	Manual/ Remote Optional
Supply Type	Switching	Switching	Switching	SCR	SCR	SCR	Switching/ SCR	SCR
Ion Sources	1,3,8cm	8,12,20cm	16,30cm	MkI	Mark II	Mark II	5,16cm RF	20,50,100 cm linear

GRIDLESS SOURCE (END HALL) POWER SUPPLIES

Features Include:

- one button operation
- short fault protection
- integrated mass flow controller with readout
- simplified set-up for process definition
- preset limits for stable anode and cathode emitting

Options Include:

- integrated hollow cathode electron source controller

RF ION SOURCE POWER SUPPLIES

CSC supplies a total RF power package for use with its RF plasma ion sources. The power package includes:

- 1000 Watt RF generator
- automatic tuning matching network
- DC supplies for plasma and accelerator grid biasing