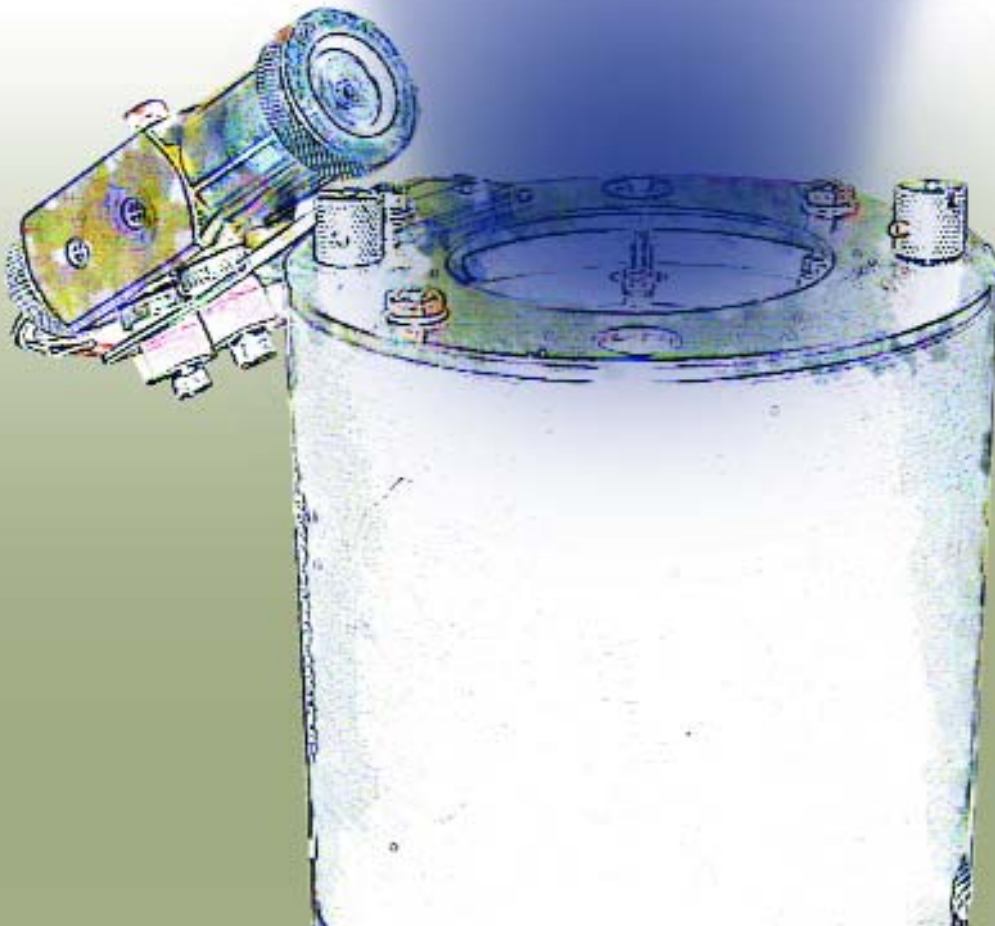




GRIDLESS END-HALL ION SOURCES

For Ion Assisted
Thin Film Deposition
&
Substrate
Pre-cleaning

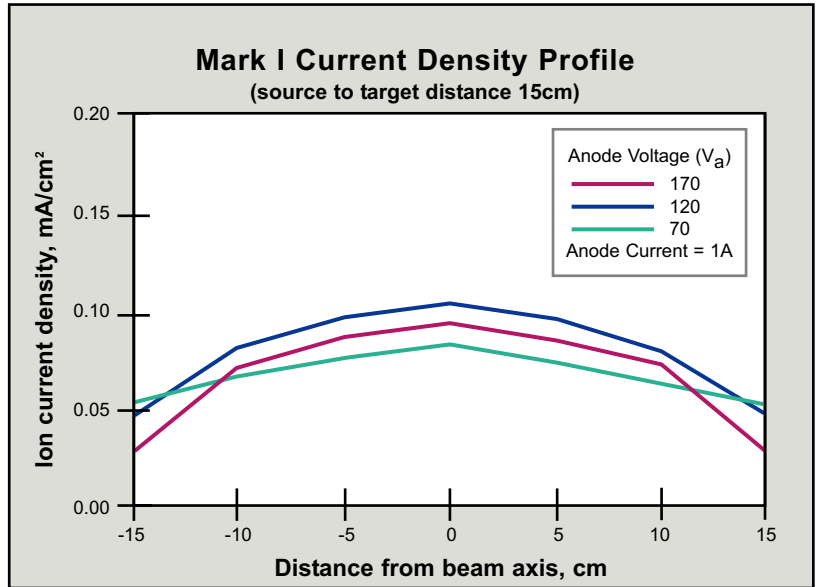


Mark I Ion Source

The Mark I End-Hall is ideal for small research and development and pilot production e-beam coating systems.

Features

- Reactive gas compatible
- Low contamination
- Rugged and reliable
- Ideal for small systems



Mark I Ion Source Specifications:

| | |
|--|---|
| Source dimensions: (dia. x length) | 6.4 cm x 11.4 cm |
| Chamber size: | up to 60 cm |
| Throw distance: (source-to-substrate) | up to 30 cm |
| Ion energy: | 40 - 120 eV |
| Beam current: | up to 200 mA |
| Operating pressure: | $< 3 \times 10^{-4}$ Torr |
| Magnet: | High-Curie point permanent |
| Cathode/neutralizer: | Immersed filament or HCES |
| Gas requirements: | 5 - 20 sccm |
| Mounting configurations: | |
| Direct | 4 5/8" Conflat |
| Remote | (2) 1", 32mm baseplate Or (1) 2 3/4" Conflat |

ion sources

Mark II Ion Source

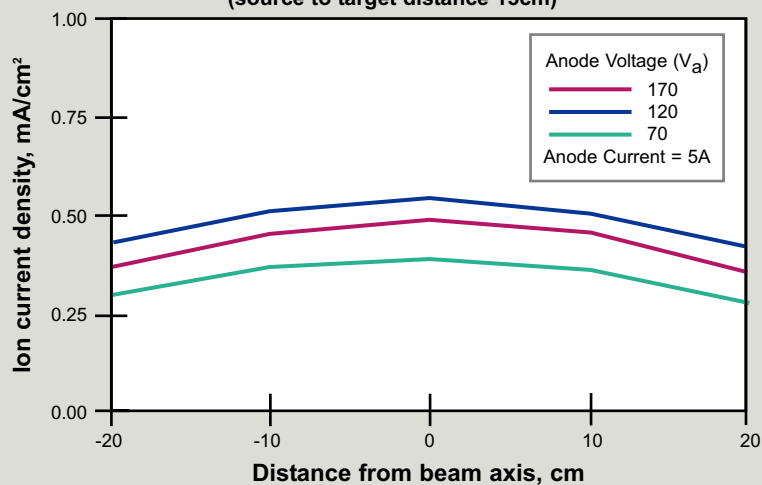
The Mark II is the industry standard source for optical coating systems and is the most widely used ion assist source.



Mark II Ion Source Specifications:

| | |
|--|---|
| Source dimensions: (dia. x length) | 14 cm × 19 cm |
| Chamber size: | 60 - 150 cm |
| Throw distance: (source-to-substrate) | 30 - 90 cm |
| Ion energy: | 40 - 120 eV |
| Beam current: | up to 1000 mA |
| Operating pressure: | $< 3 \times 10^{-4}$ Torr |
| Magnet: | High-Curie point permanent |
| Cathode/neutralizer: | Immersed filament or HCES |
| Gas requirements: | 10 - 50 sccm |
| Mounting configurations: | |
| Direct | 6" Conflat |
| Remote | (2) 1", 32mm baseplate Or (1) 2 3/4" Conflat |

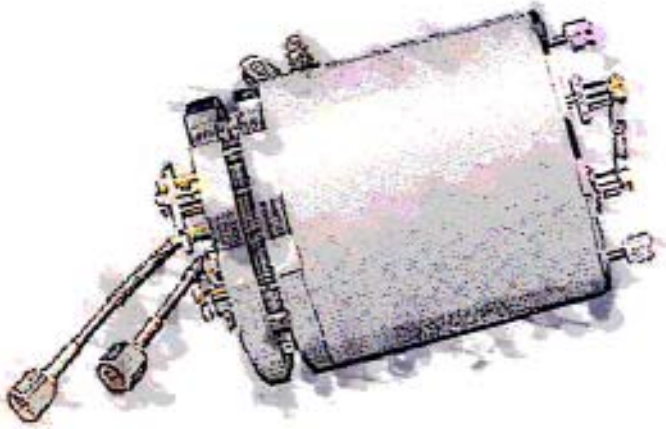
Mark II Current Density Profile
(source to target distance 15cm)



Features

- Production proven design
- Reactive gas compatible
- Low contamination
- Numerous options available

Water-Cooled Mark II Ion Source



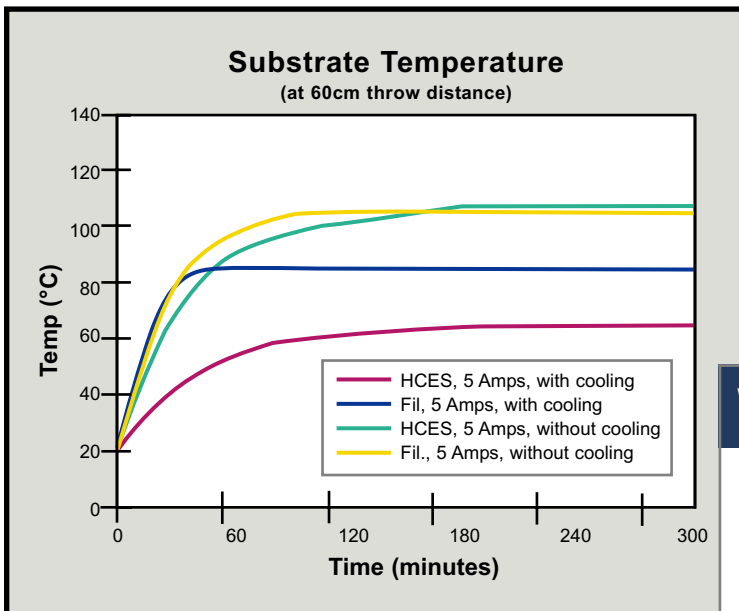
The Water-Cooled Mark II Ion Source adds efficient cooling for processes requiring low temperatures and reduced cycle times. Engineered and tested to withstand rigorous production environments, the Water-Cooled Mark II has a distinctive anode design which promotes excellent heat transfer out of the vacuum chamber and away from substrates.

Water-Cooled Features & Benefits

- Dramatically reduced substrate temperatures
- Elimination of cool-down prior to venting
- Greater ion beam stability/control

Results

- Reduced stress
- Increased production throughput
- Reproducible film properties



Water-Cooled Mark II Specifications:

| | |
|--|----------------------------|
| Source dimensions: (dia. x length) | 14 cm × 19 cm |
| Chamber size: | 60 - 150 cm |
| Throw distance: (source-to-substrate) | 30 - 90 cm |
| Ion energy: | 40 - 120 eV |
| Beam current: | up to 1000 mA |
| Operating pressure: | $< 3 \times 10^{-4}$ Torr |
| Magnet: | High-Curie point permanent |
| Tube Diameter: | 1/4 inch |
| Water temperature: | 15°C to 50°C |
| Water flow rate: | 0.5 - 1.0 gal/min @ 60 psi |

ion sources

Mark II - HCES

The Mark II ion source is configured with a Hollow Cathode Electron Source (HCES) to permit long run times with reactive gases while maintaining consistent and reliable operation. Ideal for oxygen and other long reactive processes, the HCES provides sufficient electron emission for ionization and beam neutralization.

When combined with the Super-Cooled anode, the Mark II-HCES provides the coolest operation of the Mark II Series.

Applications

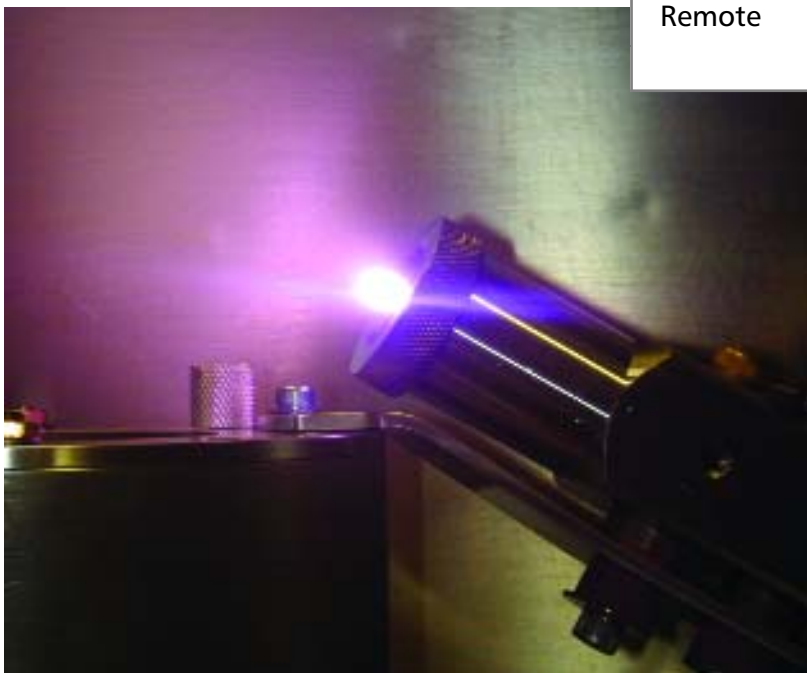
- Laser mirrors
- Narrow band pass filters

Benefits

- Filamentless operation
- Cool source operation

Mark II - HCES Specifications:

| | |
|--|---|
| Source dimensions: (dia. x length) | 14 cm × 19 cm |
| Chamber size: | 60 - 150 cm |
| Throw distance: (source-to-substrate) | 30 - 90 cm |
| Ion energy: | 40 - 120 eV |
| Beam current: | up to 1000 mA |
| Operating pressure: | $< 3 \times 10^{-4}$ Torr |
| Magnet: | High-Curie point permanent |
| Cathode/neutralizer: | HCES |
| Gas requirements: | 3 - 15 sccm |
| Mounting configurations: | |
| Direct | 6" Conflat |
| Remote | (2) 1", 32mm baseplate Or (1) 2 3/4" Conflat |



Gridless Ion Source Power Supplies

End-Hall Power Supply Controllers

Reverse compatible

- Remote I/O is pin to pin compatible

Faster operation & response

- Digital & Switching technology
- Quick start (learn)

More stable operation

- Dual regulation

More reliable

- Low stored energy & output limits

Longer filament lifetime

- Filament soft-start
- Triple filament lifetime option

eHF Power Supply Controller



eHC Power Supply Controller



End-Hall Ion Source Power Pack Controller:

Products:

Modules:

- Cathode
- Discharge
- Autocontroller

Protection:

Remote Interface:

Interchangeable:

Size:

eHF - Filament Version

Mark I and Mark II

7A emission current

Soft Start

1A or 5A & 170V DC

Standard and low voltages

System Control

Gas Control - 4 MFCs

Open or closed gas loop control

Automatic Start/Stop Sequence

Arc /Short management

Current & Power Limits

Isolated analog & RS-232

Mark I & Mark II reverse compatible

19" rack mount, 3U (13.3cm)

eHC - Hollow Cathode Version

Mark I, Mark II, Mark II HO, Mark III

10A emission current

Soft Start

10A or 5A & 300V DC

Standard and low voltages

"Autopilot" System Control

Gas Control - 4 MFCs

Open or closed gas loop control

Automatic Start/Stop Sequence

Arc /Short management

Current & Power Limits

Isolated analog & RS-232

Mark I & Mark II reverse compatible

19" rack mount, 3U (13.3cm)

ion sources

Mark II Retro-fit Kits

Water-Cooled Mark II Retro-fit Kit

Benefits of using a Water-Cooled anode

Promote amorphous/crystalline growth

- Near bulk indices

Increased packing density

- Eliminates water absorption
- Low spectral shift
- Hard, environmentally durable coatings

Improved Step Coverage

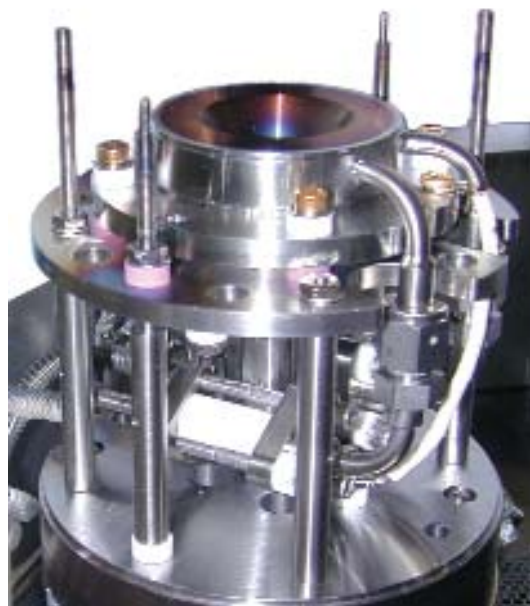
- Preferred grain sizes and boundaries
- Minimizes scatter and absorption

Improved Adhesion

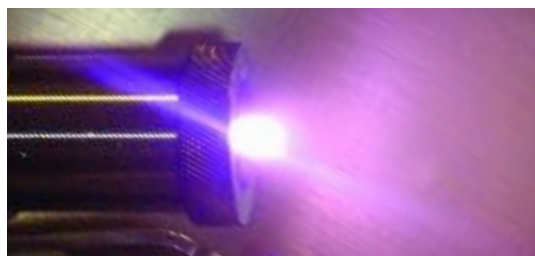
- Films adhere to substrates and each other

Control Stoichiometry

- Predictable and reproducible films



Hollow Cathode Electron Source Retro-fit Kit



Used instead of a tungsten filament, the Hollow Cathode Electron Source (HCES) ensures a contamination free environment and reduces maintenance intervals.

Intlvac's new Hollow Cathode Tip can run for over 150 hours before replacement.



eHC Power Supply Controller

NANOCHROME™

Deposition Systems

Process Methods

- Ion Beam Assisted Deposition (IBAD)
- Co-Evaporation
- Multi-Layered E-Beam Deposition
- Thermal Evaporation
- Planar Magnetron Sputtering



Applications

- Precision Optical Coatings
- Optical Filters
- Anti-Reflective Coatings
- Semiconductors & Dielectric Materials
- Superconductors
- Ophthalmic Coatings
- Photovoltaics



NANOQUEST

Ion Beam Systems

Process Methods

- Ion Beam Etching
- Ion Beam Sputter Deposition
- Ion Beam Assisted Deposition (IBAD)
- Reactive Ion Beam Etching (RIBE)™
- Chemical Assisted Ion Beam (CAIBE)



Applications

- Fuel Cells
- Magnetic Materials
- Semiconductors
- Superconductors
- Wear Coatings
- Corrosion Resistant Coatings
- Opto-electronics
- Diamond Like Carbon (DLC)

