



POINTED POLE ANODE LAYER ION SOURCE

High Performance Industrial Ion Source

- Patented Pointed Pole Advancement
- High Dynamic Etch Rate
- 10x Reduction in Contamination
- Industrial, High Power Design



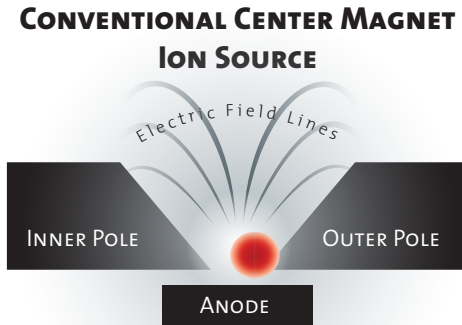
GENERAL PLASMA INC.™

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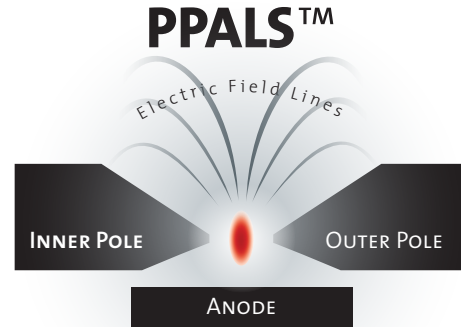
POINTED POLE ADVANCEMENT

Shaped magnetic poles create strong, symmetrical magnetic mirrors that focus electrons into the center of the discharge region. Ion production is advantageously concentrated away from the poles.



ASYMMETRICAL MAGNETIC FIELD

- Plasma **Not** Centered
- **Weak** Mirror Confinement

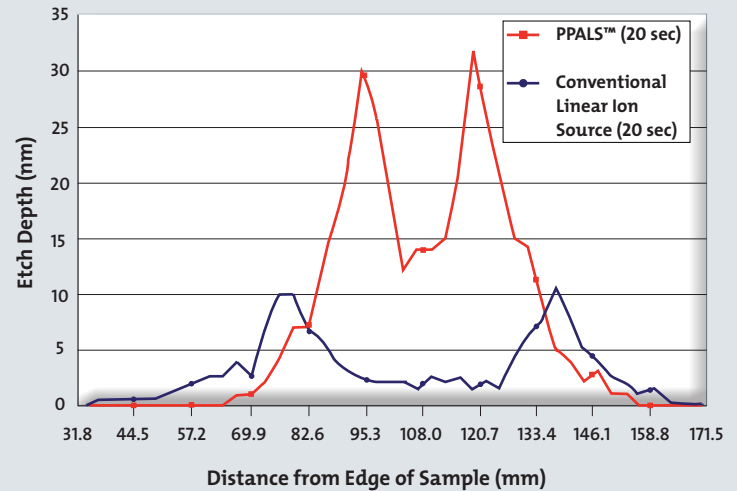


SYMMETRICAL MAGNETIC FIELD

- Plasma **Centered**
- **Strong** Mirror Confinement

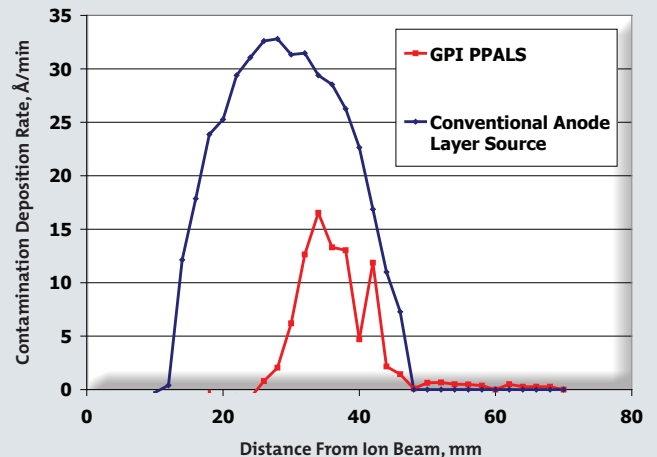
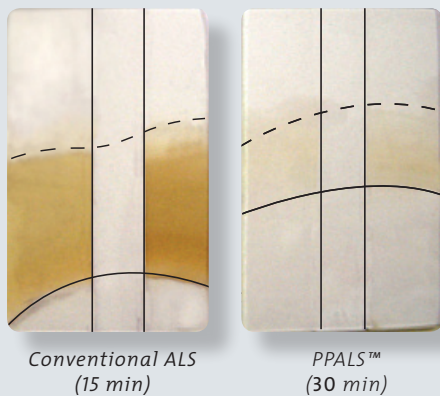
HIGH PERFORMANCE ION BEAM

The highly collimated nature of the PPALS™ beam is evident when compared to a conventional anode layer ion source in a static etch test. Typical maximum etch rates exceed 15 nm.m/min.



10X REDUCTION IN SUBSTRATE CONTAMINATION & POLE SPUTTERING

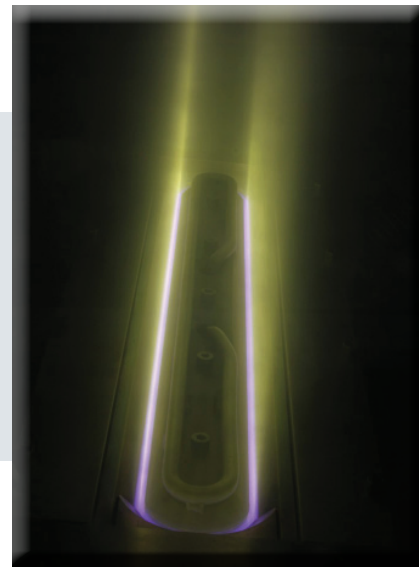
Comparison between conventional, center magnet anode layer ion sources and PPALS™ shows a dramatic reduction in pole sputtering with PPALS™



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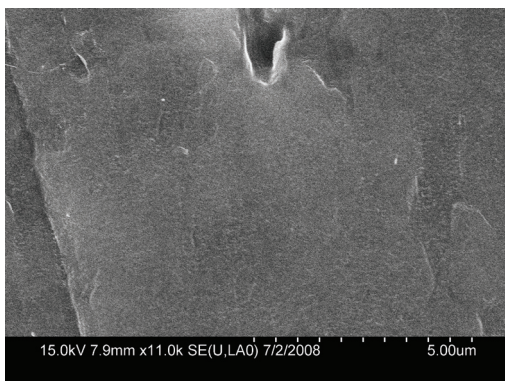
TYPICAL APPLICATIONS

- REMOVAL OF SURFACE CONTAMINATES
- ETCHING OF SURFACE COATINGS OR BULK SUBSTRATES
- ADHESION PROMOTION
- REMOVAL OF SURFACE OXIDES

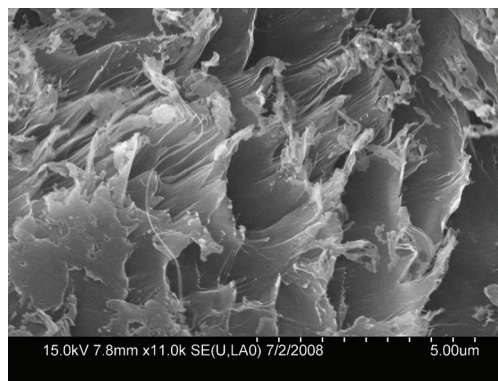


EXAMPLE

Adhesion promotion – Surface roughness can be increased to promote adhesion by increasing the number of dangling bonds. These SEM images show the surface of PTFE substrates before and after ion treatment with an oxygen and argon mixture. Note the increased surface roughness of the treated sample (below right).

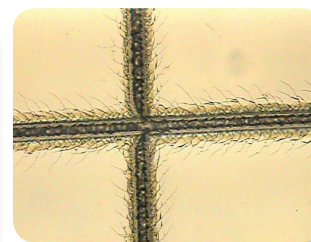
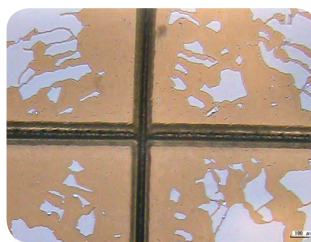


Untreated PTFE substrate surface at 11000x magnification

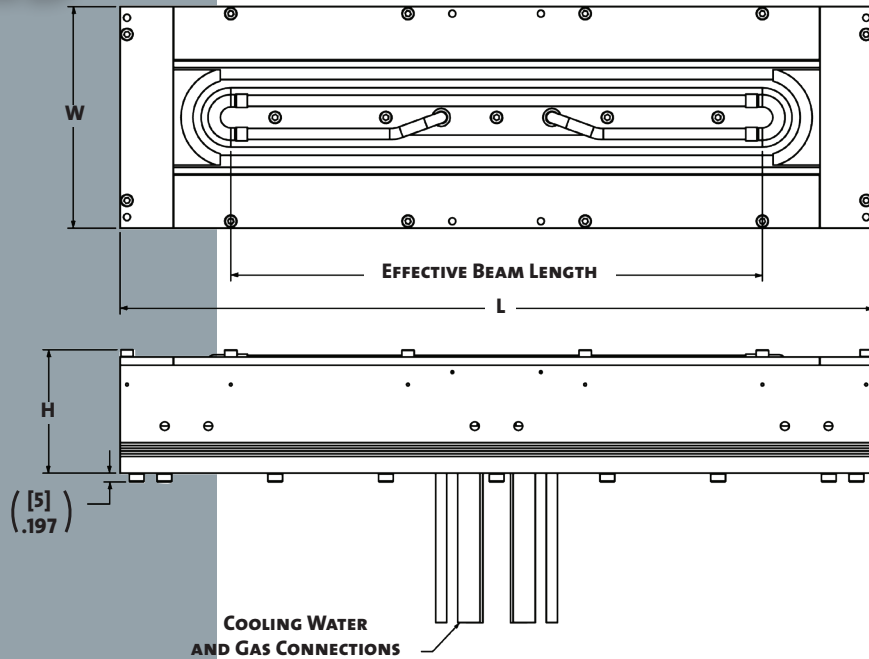


PPALS treated PTFE substrate surface at 11000x magnification

The increased adhesion properties can be seen in these microscope observations after MIL-Spec tape removal tests of ITO coatings on untreated and PPALS™ treated optical film (Polyolefin).



PPALS™



PRODUCT SIZES & SPECIFICATIONS

| | PPALS30 | PPALS36 | PPALS56 | PPALS81 | PPALS112 | PPALS142 | PPALS203 | PPALS304 | PPALS325 |
|------------------------------------------------------|-----------------------------------------------------------------------------------------------|--------------|----------------------|--------------------------------------------------|--------------------------------------------|-------------------------------------------------|---------------------|--------------------------------------------------|----------------|
| HEIGHT (H) | 8.0cm (3.15") | | | | | | | | |
| WIDTH (W) | 12.7 cm (5") | | | | | | | | |
| LENGTH (L) | 43.2cm (17") | 48.7cm (19") | 68.7cm (27") | 93.7cm (37") | 124.7cm (49") | 154.7cm (61") | 215.7cm (85") | 316.7cm (125") | 337.7cm (133") |
| EFFECTIVE BEAM LENGTH (MAX SUBSTRATE SIZE) | 30.5cm (12") | 36cm (14") | 56cm (22") | 81cm (32") | 112cm (44") | 142cm (56") | 203cm (80") | 304cm (120") | 325cm (128") |
| UNIFORMITY | +/- 2.5% OVER RECOMMENDED SUBSTRATE WIDTH (EFFECTIVE BEAM LENGTH - 4CM) | | | | | | | | |
| ION ENERGY | 1500 TO 2500eV | | | | | | | | |
| OPERATING PRESSURE* | < 1.3x10 ⁻³ MBAR (< 1mTorr) | | | | | | | | |
| GAS FLOW* | 10-60sccm | 10-100sccm | 10-150sccm | 10-200sccm | 10-250sccm | 10-300sccm | 10-350sccm | 10-450sccm | 10-500sccm |
| WATER | ≥ 1.0GPM ≥ 4LPM | | ≥ 1.2GPM ≥ 4.5LPM | ≥ 2GPM ≥ 7.5LPM | ≥ 3.4GPM ≥ 12.75LPM | ≥ 4.1GPM ≥ 15.5LPM | ≥ 5.1GPM ≥ 19LPM | ≥ 6.1GPM ≥ 23LPM | |
| DISCHARGE VOLTAGE | 600 TO 4000VDC | | | | | | | | |
| MAX DISCHARGE POWER | 2.5kW | 2.5kW | 2.5kW | 4kW | 4kW | 8kW | 8kW | 14kW | 14kW |
| MOUNTING OPTIONS | FLANGE OR REMOTE MOUNT OPTIONS AVAILABLE | | | | | | | | |
| POWER SUPPLY SPECIFICATIONS | | | | | | | | | |
| MAXIMUM POWER | 3kW | | | 5kW | | 10kW | | 16kW | |
| INPUT VOLTAGE | SINGLE-PHASE, 198-264V RMS, 48-63HZ INPUT | | | | THREE-PHASE, 187-242V RMS, 48 - 63HZ INPUT | | | | |
| OUTPUT VOLTAGE | 4000 V MAX | | | | | | | | |
| INPUT CURRENT | < 16A AT 220V | | | < 20A PER PHASE | | < 45A PER PHASE | | < 70A PER PHASE | |
| POWER SUPPLY SIZE | 177mm x 483mm x 508mm (7.0" x 19.0" x 20.0") | | | 266mm x 483mm x 610mm (10.5" x 19.0" x 24.0") | | 222mm x 483mm x 610mm (8.7" x 19.0" x 24.0") | | 889mm x 483mm x 610mm (35.0" x 19.0" x 24.0") | |
| INTERFACES | FRONT PANEL, REMOTE CONTROL VIA TERMINAL BLOCK. OPTIONAL SERIAL COMMUNICATIONS ALSO AVAILABLE | | | | | | | | |

FOR INQUIRIES, PLEASE CONTACT:

*Specified using oxygen

All dimensions are approximate and subject to change.



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General Plasma is an innovation leader in vacuum thin film coating. GPI's patented and patent pending plasma inventions provide superior performance for applications such as solar energy, architectural glass, data storage and scientific research.

Contact GPI for your ion source and sputter magnetron solutions today!