



**Mask Etcher™: 0.25 μm to Next Generation Lithography
with the largest worldwide install base**

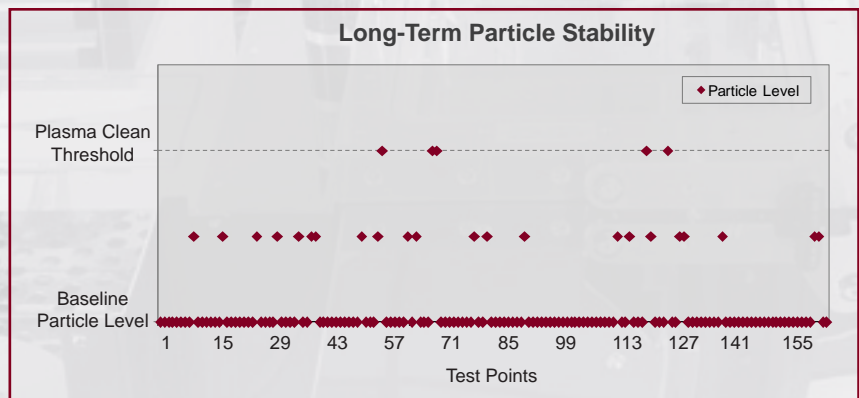


Mask Etcher®

Mask Etcher Systems Set Dry Etch Performance and Flexibility Standards for the Highly Specialized Photomask Market

A wide variety of films can be etched from entry level 250 nm technology to <32 nm production with ICP high-density plasma etch systems. Excellent uniformity, repeatability and particle control are achieved for a wide range of process requirements.

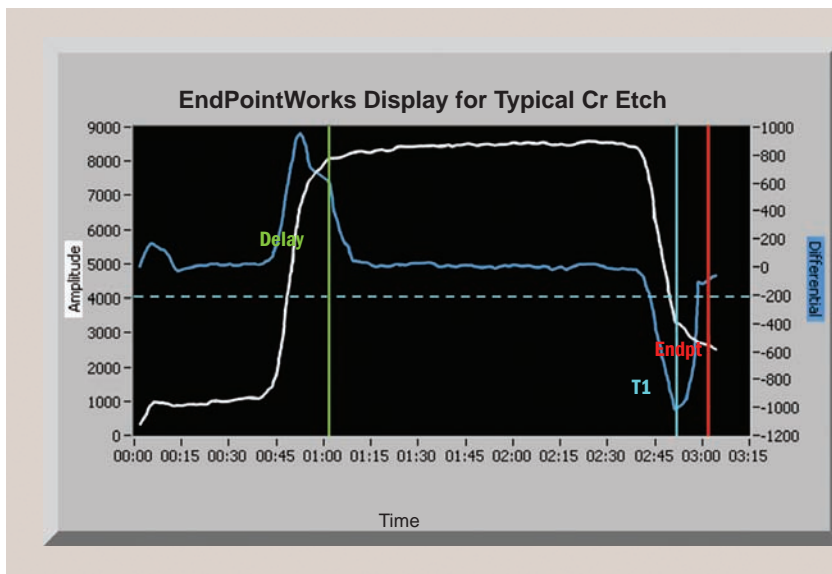
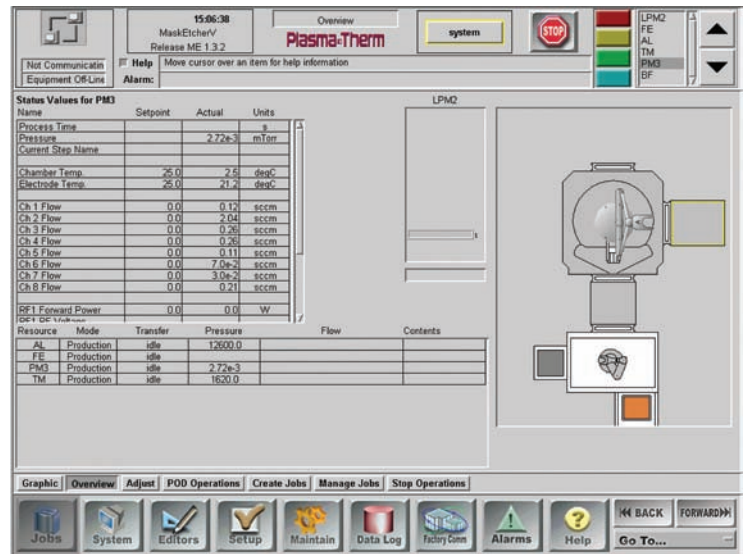
- Maximized productivity and low cost of ownership
 - High uptime (>95%)
 - High yield
 - Easy chamber clean
 - Easy process re-qualification
- Several front end handling options
 - Ball room or through wall
 - Automated Load Station (ALS)
 - SMIF on Automated Front End (AFE)
- Mask specific requirements
 - Long term particle stability
 - Fast recovery after clean
 - Long term process stability
- Dedicated platform specifically built for the photomask market
 - Uniformity control and minimized loading
 - Low etch bias
 - Good feature fidelity
 - Low particle count
 - Low line edge roughness
 - Cr, MoSi, Quartz, EUV and imprint technology



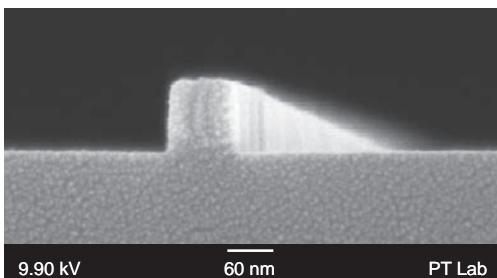
MASK ETCHER EVOLUTION

Mask Etcher	II	III	IV	V
Node (nm)	250-180	130-90	65-45	32-22
Etch Bias (nm)	100	<60	<45	<30
CD Unif (nm)	20	<15	<10	<5
Linearity (nm)	-	<15	<10	<5
Particle	<20	<12	<8	<5

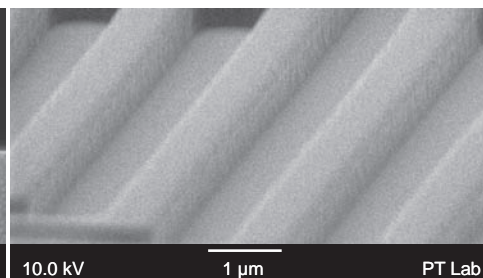
- Demonstrated robust software on installed production systems
 - User friendly ControlWorks™ - based software
 - Comprehensive data logging
 - Automated clean programming
 - Real-time process data display
 - Fully integrated with endpoint system
 - Factory automation compatible (SECS/GEM)
 - Multiple user access levels
 - Alarm history



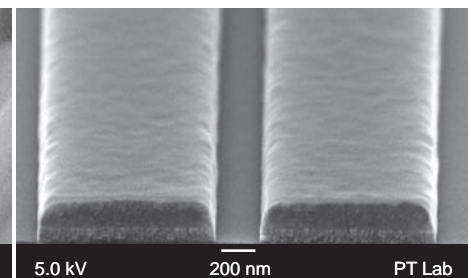
- Advanced process control using Plasma-Therm unique EndPointWorks™
 - Real time endpoint monitoring
 - $\leq 1\%$ repeatability
 - Optimized chamber control
 - Optical Emission Spectroscopy (OES)
 - Laser endpoint reflectometry
 - High end components stability



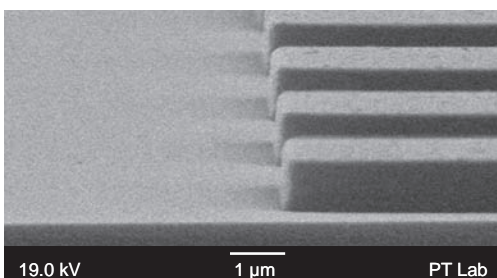
60 nm dark line in Cr



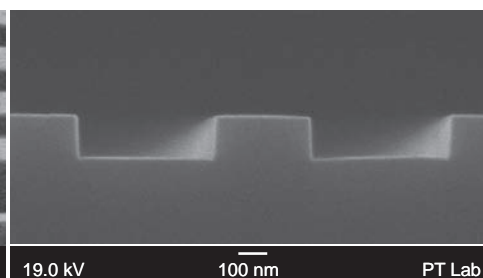
Low line edge roughness



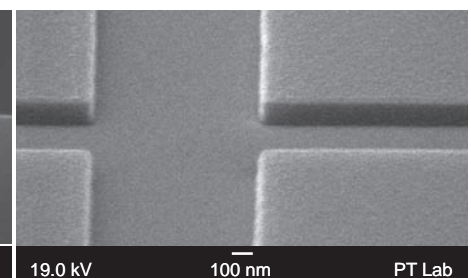
High selectivity Cr:PR



Smooth clean etched surfaces



Typical quartz etch profile



Accurate reproduction of the features

SPECIFICATIONS

Chamber Controlled Temperature	Within 2°C up to $70^{\circ}\text{C}</math>$
Electrode Size	From 11" to 15.6" diameter
Loading	ALS or SMIF opener with buffer station
Control System	ControlWorks™ based (with data logging)
Pumping	Turbo Pump 1300 l/s minimum
Gas Lines	Up to 8 channels
Endpoint Detection	Laser Endpoint Reflectometry (OEI) Optical Emission Spectroscopy (OES)
RF Power Supply	RIE frequency adapted to application 2 kW @ 2 MHz ICP
Installation Configuration	Through-wall or Ballroom
Power Requirements	200-230 V, 50/60 Hz, 4 wire 400 V, 50/60 Hz, 4 or 5 wire
Certifications	CE, SEMI-S2, S8



MASK ETCHER® V LAYOUT

