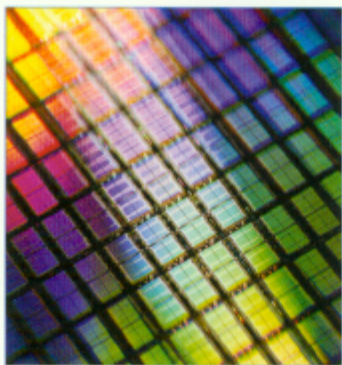


HRM source

Competitive High Silicon Etch Rates.....Achieved

With market leading etch rates using a conventional de-coupled plasma source, the HRM provides a cost effective Deep Reactive Ion Etch (DRIE) processing chamber. Designed to offer high etch rates, while controlling ion damage, the HRM is ideal for deep anisotropic silicon etching using STS' ASE® process technology.

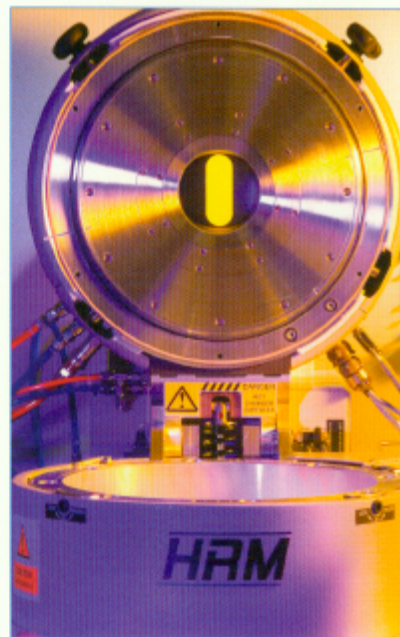


High etch rates with enhanced profile control and improved mask selectivity are achieved as a result of STS' 'Source Enhancer' technology and 'Ion Attenuator', both standard on the HRM plasma source. The ability to maximize the etch species and control the ion flux at the wafer surface means that ion related damage is minimized. This results in increased mask selectivity and etch rate with a reduction in the breakdown of the sidewall passivation layer enabling the etching of high aspect ratio features.

A normal effect of DRIE or the 'Bosch process' is sidewall scallops. The sidewall roughness, or effective size of the scallop, can be improved by positioning fast switching MFCs close to the process chamber. This comes as standard on the HRM

chamber. Another standard is the 'Boost and Delay' software control that incorporates the patented 'Parameter Ramping' feature. This allows within step process control delivering a fully flexible system.

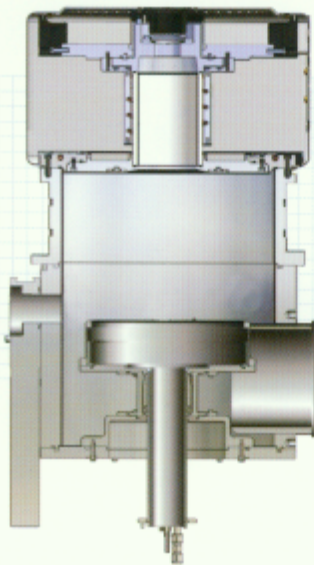
Designed to minimize Cost of Ownership (CoO), the HRM offers increased mean wafers between clean (MWBC) by reducing the amount of polymer deposition during the process through heating the chamber components. This also improves the wafer-to-wafer run stability improving device yield and performance. The open system design architecture and hinged source reduce the mean time to mechanically clean (MTTC) the chamber, confirming our commitment to reducing the CoO.



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SURFACE TECHNOLOGY SYSTEMS



Simplified cross-section of the HRM source

The HRM is compatible with all STS wafer handling platforms offering a logical upgrade path from R&D to full scale production.

Etch Applications

- ASE® deep silicon etch processing

Electrostatic Clamping

HRM process modules now come with STS' TD-ESC electrostatic clamping as standard. The key benefits are:

- Higher etch rates achievable due to improved heat transfer
- Improved etch rate uniformity
- Minimal degradation of ESC surface during 'no-wafer' plasma cleaning
- Ability to clamp a wide range of substrate materials including insulating substrates (providing a conducting layer exists)

Key Benefits of HRM source

Enhanced Process Performance

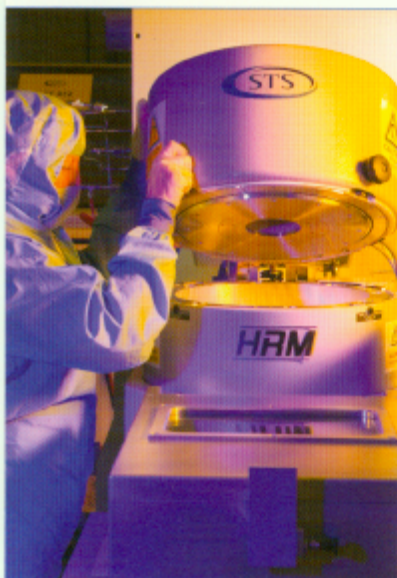
- Etch rates typically 3 times higher than standard rate "Bosch" processing, without sidewall breakdown

High Device Yield

- Smoother sidewalls without etch rate reduction, by reducing scallop size using fast switching, close coupled MFCs
- TD-ESC improves cross-wafer etch uniformity

Low CoO

- High etch rate increases throughput
- Heated chamber increases mean time between cleans
- Reliable electrostatic clamping reduces consumable costs



HRM on STS MACS Platform

Technical Summary

Plasma generation	De-Coupled	Antenna RF frequency	13.56MHz
Ion attenuation	Yes	Antenna RF power	3kW
Parameter Ramping® software	Yes	Heated chamber wall	>100°C
"Bosch" processing capability	Yes	Subst. electrode RF power	30W/300W/13.56MHz*
Typical ion density at wafer	8x10 ¹⁰ cm ⁻³	Substrate temperature range	-20 to +40°C
Process pressure range	1 to 100mTorr	Clamping	ESC
High vacuum pumping capacity	2000l/s	# of standard gas lines	8 (non purged) or 4 (purged)
Ultimate base pressure	1x10 ⁻⁶ Torr		

*500W/380KHz option available for SOI applications in ASE® processing