Deep Silicon Etch™ (DSE) Technology for Advanced MEMS & TSV Applications

FROM PILOT TO FULL PRODUCTION

Plasma-Therm

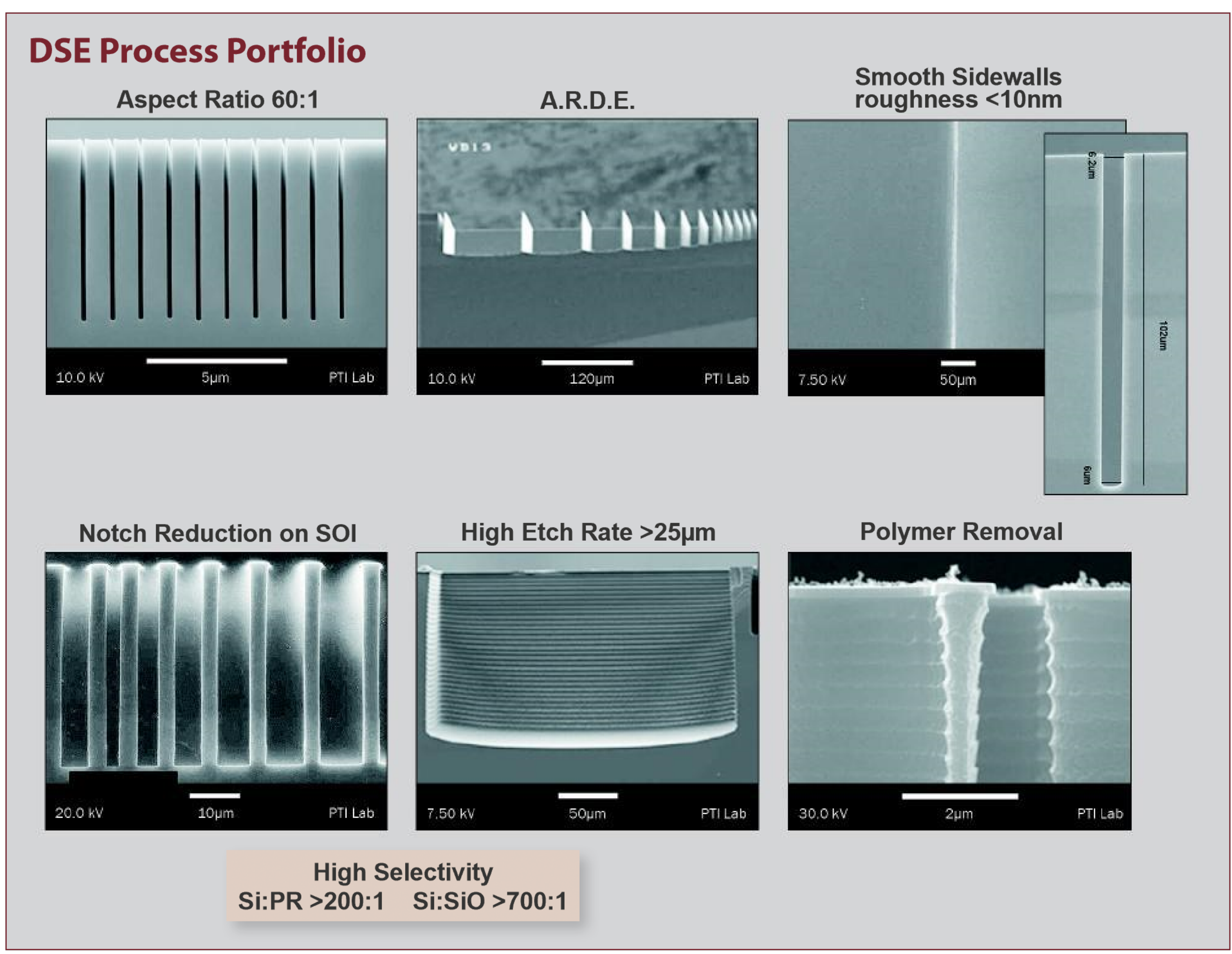
Plasma-Therm VERSALINE

VERSALINE® DSE

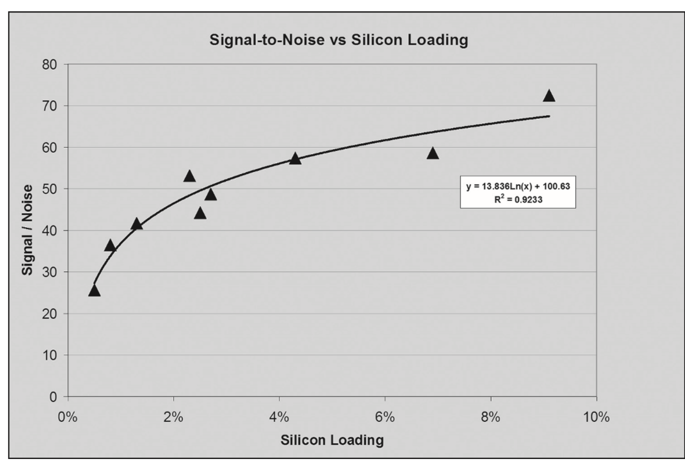
VERSALINE® DSE offers high throughput and low cost of ownership

Complex and high quality MEMS structures are achieved with VERSALINE® DSE IV. Its DRIE technology delivers both Bosch and non-Bosch processing for a wide variety of applications.

VERSALINE DSE incorporates multiple patented innovations, including parameter morphing, fast gas switching, and PID throttle-valve pressure control. These enhanced capabilities allow etching of any shape from big cavities to high-aspect-ratio (up to 60:1) nanostructures. DSE IV provides the highest etch rate, high selectivity to oxide and photoresist, and low damage on sensitive devices such as shiny aluminum. Additional information is available from Plasma-Therm Applications notes.



End point detection by OES



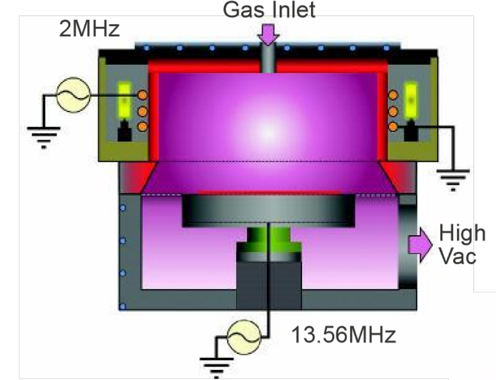
Silicon etching can be stopped on process time, or for greater accuracy, using EndpointWorks detection of the SOI interface. Optical emission spectroscopy (OES) can detect a 1% silicon signal. Laser reflectance or Optical Emission Interferometry (OEI) end point detection systems are also available.

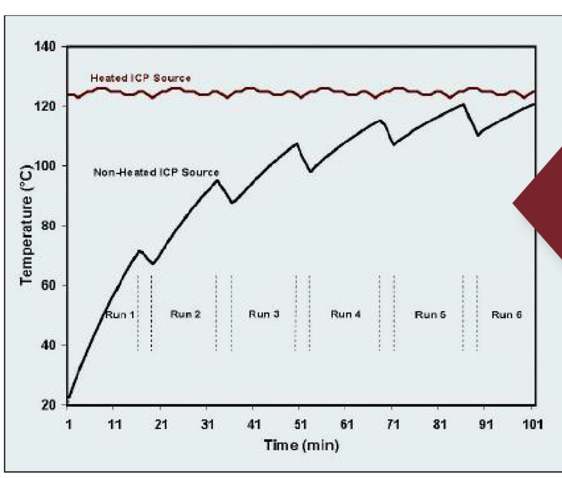
Industrial performance

DSE IV technology was developed for high-volume production and industrial performance, low cost of ownership and high throughput. Low maintenance requirements and high mean time between cleaning are integrated throughout:

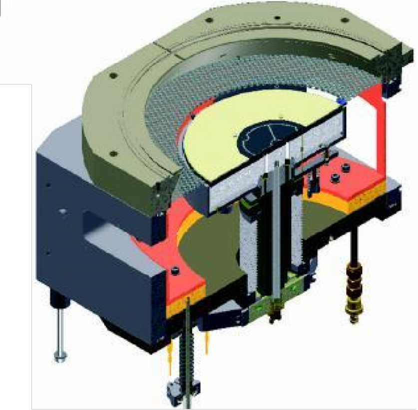
- Heated source
- Heated chamber
- Heated throttle valve
- Heated turbo pump and foreline

Process stability and repeatability, both within wafer and wafer-to-wafer meet customers' expectations mainly by having a stable hardware and no by-products deposition on chamber wall.





- Eliminates first-wafer effect
- Improves wafer to wafer repeatability
- Minimizes wet-clean cycle



Uptime > 92%
MTBC > 500 RF hours
MTTC < 6 hours
MTBF > 500 RF hours

Easy maintenance

Ergonomic source lift mechanism for **easy chamber cleaning**

Decrease tool offline time with ergonomic maintenance access

Low maintenance time results in **higher productivity**

Rail-mounted turbo pump for **easy maintenance**

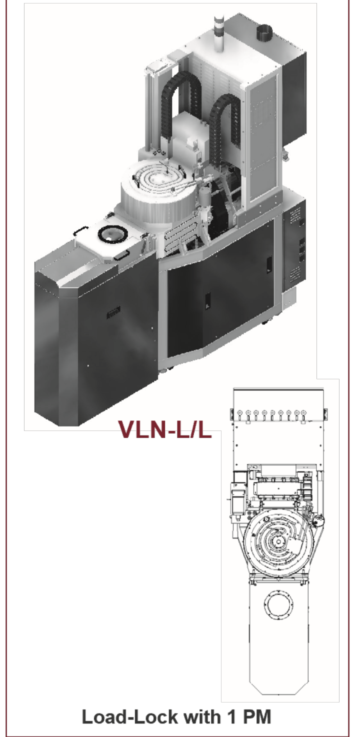
Wafer-size versatility

Process modules and transfer platforms developed by Plasma-Therm are able to clamp and process a wide range of SEMI standard and non-standard wafers:

- 4, 6 and 8 inch diameter wafers
- Si, SiO2, SOG, glass and other substrates
- Wafer thickness from 120µm to 2mm
- Bow up to 1mm
- Etch-through of all wafers

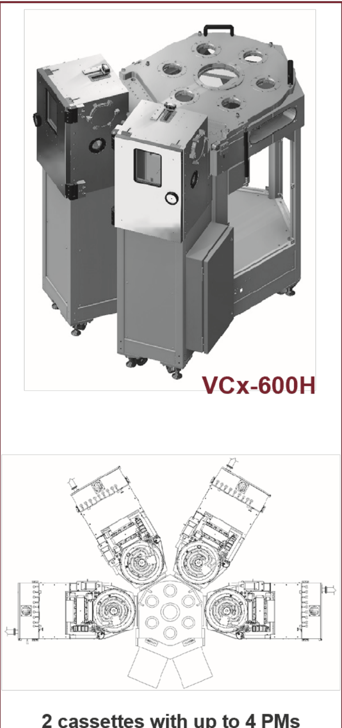
Integrated optical aligners detect wafer flats or notches if required.

Transfer platform configurations

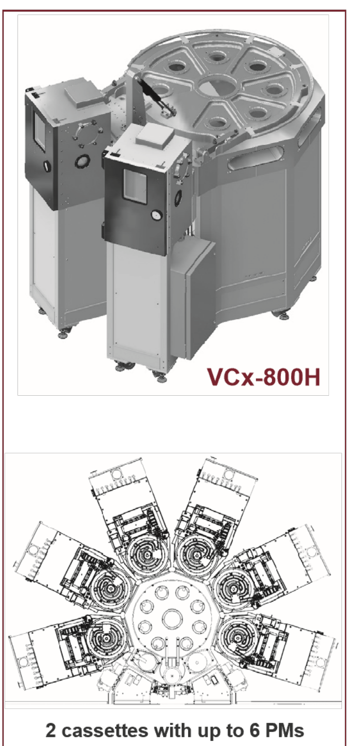


Load-Lock with 1 PM

1 cassette with up to 3 PMs



2 cassettes with up to 4 PMs



2 cassettes with up to 6 PMs

Universal process modules compatible with multiple transfer platforms

Plasma-Therm has long experience with cluster tools in R&D and production settings, and can recommend the best configuration based on customer need and chemistry. Handling systems and control-software logic minimize cross-contamination.

Support and service

Plasma-Therm provides worldwide technical and service to customers, with hot-line and remote diagnostic support as well as superior on-site service. Spare parts are warehoused in six strategic global locations. Plasma-Therm has been ranked by VLSIresearch among the best equipment suppliers for the last 16 years, winning 1st place rankings among etch and clean equipment suppliers for five years in a row.

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