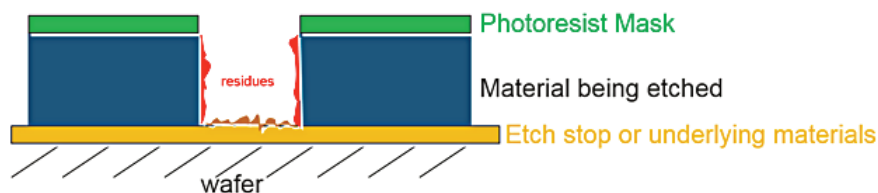


Immersion and Single Wafer Processing

The Problem

Photoresist masks used for pattern definition by plasma or ion beam etching are hardened and highly cross-linked in order to withstand the etching process. In addition the high temperatures and material re-deposition on the patterned sidewalls and resist structures during these dry etching processes create an additional difficulty to remove the resist film and residues.

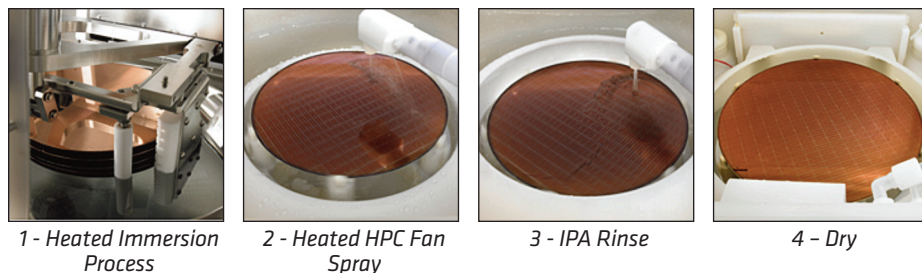


The Challenge

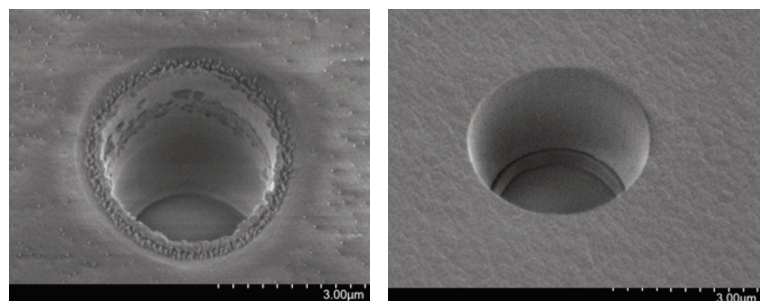
How to remove hardened and cross-linked photoresist mask and sidewall residues without pattern damage, corrosion, and residue?

The Solution - WaferStorm® Solvent Tool with ImmJET™

Veeco has developed a stripping process using a combination of batch immersion followed by single wafer spray processing:



Soaking the wafers in solvent at high applied temperature that is close to the flash point helps the resist to swell. Then the combination of chemistry and physical force (high pressurize chemical spray) is able to crack the hard crust and penetrate to dissolve the underlying resist. Appropriate solvent formulations are used to strip resist and residues in one step.



As-received after Etch

Post Strip and Residue Removal

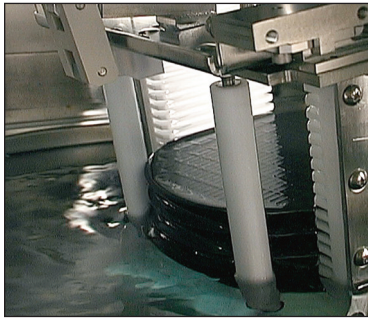


Two Technologies in One Tool

Veeco PSP has combined two process techniques in a single system to provide superior results at the lowest cost of ownership. Immersion processing is used with heated solvents for longer cycle time processing, while the single wafer spray process is used as a final processing step. Because each system is a sealed, nitrogen purged system, with separate solvent recirculators, solvent consumption, emissions, and disposal are kept to an absolute minimum.

Batch Immersion Processing

Each wafer is soaked under precisely controlled conditions in a heated, recirculated, solvent immersion bath. Typical soaking times are on the order of 20 minutes, with the robotics system automatically shuttling wafers in and out, based upon the downstream process times and number of single wafer spray stations. After the initial soaking time for the first wafer, this sequencing maintains a high number of wafers per hour per square foot.



Heated Solvent Immersion Processing



Wet Wafer Transfer by Robotics



Heated High Pressure Spray

Single Wafer Solvent Spray Processing

Following the sequenced immersion step, the surface of the wafer remains solvent-wet during transfer to the single-wafer spin process station. With the resist softened from the soak, the use of a high-pressure chemical fan spray enhances the removal of the resist and back-scattered residues, ensuring a clean, resist-free surface. The high pressure process includes needle and fan spray, both with heated solvent solutions at pressures up to 3,000 PSI. The high pressure spray is fully controlled through a flow rate monitoring system, with per-wafer data collection. The high pressure spray process is enhanced by the action of point-of-use, high pressure solvent heaters. The wafer is then transferred to a spin-rinse-dry station where the surface is completely cleaned and becomes particle-free using an IPA or DI Water rinse.



Veeco WaferStorm® Solvent Tool

Whether your needs are for stripping in pilot or mass production volumes, Veeco offers you a dry-in/dry-out solution. All systems SEMI S2-0706E safety compliant, SEMI S8-0705E ergonomic compliant, ETL listed, and CE marked.

Learn more about Veeco's single wafer process capabilities at www.veeco.com/PSP

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