

Under Bump Metal Etch for Advanced Packaging Technology



Single Wafer Wet Etch Technology for Automatic Sequential Manufacturing Processes

Veeco Precision Surface Processing technology allows for an automatic sequential process for critical Under Bump Metal applications with:

- > Programmable etch rate
- > Chemical recirculation
- > Post etch clean-up with high velocity spray
- > WaferChek® in-situ adaptive process control for endpoint detection

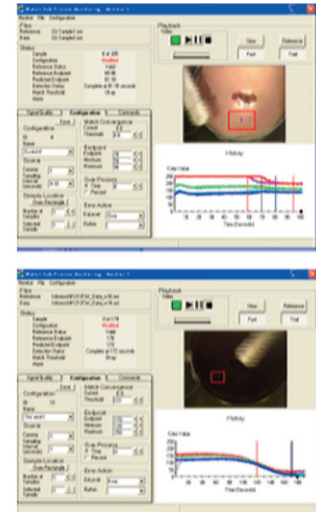


Precision Surface Processing

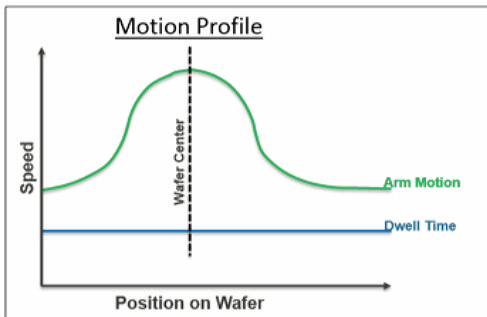
Veeco Precision Surface Processing Advantage

Veeco's single wafer wet etch technology implements an automatic sequential process. For Under Bump Metal (UBM) etching minimal undercut is paramount and undercut is a function of etch time. By terminating the process at the completion of the etch the undercut is kept to a minimum. This adaptive, per-wafer control utilizes a color CCD camera and Veeco's proprietary WaferChek software. The wafer color changes as the metal etches away. With an optimal setup, the color shift appears uniformly over the entire surface of the wafer. The process is complete when the wafer reaches a specified color. The dry-in/dry-out operations can include both a resist strip module with solvent recirculation and CO₂ fire suppression, and a post-etch cleanup module.

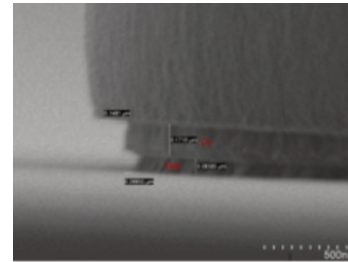
Wet etching rates can be controlled by traditional techniques of managing chemistry concentration, temperature and flow rate. If an etch rate changes due to chemistry, temperature or concentration, the WaferChek system automatically changes the dispensing time so that the same etch will be achieved on each wafer. The result is uniform film conditions, wafer to wafer, despite process variables. This is advantageous for both single pass and recirculated chemistry applications.



Copper etch followed by TiW etch and illustrating endpoints for each



Use of non-linear hyperbolic motion profile provides constant dwell time across the wafer surface for uniform etching of films. Speed, acceleration, and nozzle height are all programmed by recipe for controlling etch uniformity.



Chemical Recirculation

All of Veeco's molded chambers are available with internal, programmable open or closed chemical collection system. This open or closed system is programmable by individual step, including delay time, and will enable precise control over the collection of fluids for chemical recirculation. Collection efficiencies are >99%. When closed, the collection ring is sealed shut and will not allow invasion from other fluids, even an aggressive post etch spray process.



Open for Fluid Collection



Closed for Rinse

Control of Chemistry Concentration and Temperature

Veeco's WaferEtch® includes PC programmable chemical blending, with complete feedback control. On-the-run temperature control, driven by the PC according to the user's recipe, with heaters sized according to desired flow, achieves full single wafer control for maximum etch selectivity.

Etch Rates and Chemistry

On-board chemical blending can be used to mix standard etchants. Some examples are shown below.

Cu: H₃PO₄:H₂O₂:H₂O 1:1:50 at 20°C for ~3000Å/min

Ti: H₂O:HF 200:1@ 20°C for ~500Å/min

TiW: H₂O₂ (5%) @ 75°C for ~1500Å/min

Use of specialized formulations for increased etch selectivity are also available.

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

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