Application Note
Semiconductor Industry

SCHMIDT HAENSCH

Post-Etch Residue Removal with EKC® Chemicals

Real-Time Monitoring of Water Content for Reliable Wafer Cleaning

Post-etch cleaning is an important step in semiconductor manufacturing. After etching, polymer residues can remain on the wafer surface and must be removed before subsequent process steps. Spray solvent tools are commonly used for this purpose, with EKC® chemistry serving as a post-etch cleaning solution for the removal of residual polymers.

The composition of the cleaning chemistry has a direct influence on process performance. In particular, the water content of the EKC® solution must remain within a defined operating range. Excessive water content can increase the risk of corrosion, while insufficient water content can reduce the effectiveness of polymer removal. Reliable monitoring of the solution is therefore important for maintaining consistent cleaning conditions and protecting both wafers and process equipment.

Increasing Importance of Wet-Chemical Process Control

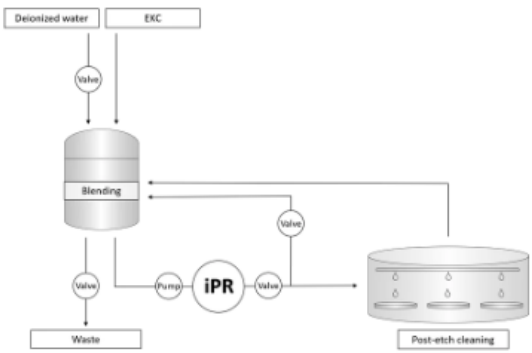
Modern semiconductor fabrication relies on numerous wet-chemical processes for cleaning, etching, surface preparation and chemical mechanical planarization. Small changes in chemical composition can affect process repeatability and may ultimately contribute to wafer defects, equipment contamination or unnecessary chemical consumption. Continuous monitoring provides an opportunity to detect deviations before they influence subsequent wafer processing. Traditional process control can depend on predefined replenishment intervals or discrete sampling. Inline refractive-index measurement provides an alternative by continuously measuring the liquid directly in the process.

Refractive Index as a Process Analytical Tool (PAT)

The refractive index (RI) changes with the composition of a solution. For post-etch residue removal, the refractometer can be integrated into the EKC® recirculation loop. After a wafer run, the chemistry is returned to the tank, where part of the solution may be replaced and the composition adjusted. Because water can evaporate through the exhaust system during operation, its concentration can change over time.

Continuous refractive-index measurement provides an immediate indication of these concentration changes. Once an application-specific correlation between refractive index, temperature and EKC®/water composition has been established, the measurement signal can be used to monitor the process against defined concentration limits.

The same principle has already demonstrated high sensitivity in demanding semiconductor applications. In an ILD oxide slurry study, for example, refractive-index measurements showed a coefficient of determination greater than 0.99 for the correlation between RI and density, and the inline signal was subsequently used for slurry dilution control.



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Solution from SCHMIDT + HAENSCH

Using the **SCHMIDT + HAENSCH iPR S Inline Process Refractometer** for semiconductor industry represents a reliable solution for continuous monitoring of EKC® cleaning chemistry directly in the process line. The instrument is designed for demanding semiconductor wet-chemical applications where precise and stable process control is essential. By continuously measuring the refractive index of the cleaning solution, changes in the EKC®/water composition can be detected in real time. This is particularly important in post-etch residue removal, where the water content must remain within a defined operating range to ensure effective polymer removal while minimizing the risk of corrosion. By integrating the iPR S into the EKC® circulation system, process operators gain immediate insight into the condition of the cleaning chemistry. In the event of a concentration deviation, the measurement signal can be used to trigger alarms or support controlled replenishment and chemical adjustment, helping to maintain stable cleaning conditions, reduce unnecessary chemical consumption, and improve overall process consistency.



Product type	Product
Process Refractometer	**iPR S** Inline Process Refractometer

Advantages

- Continuous, real-time monitoring of EKC® solution composition
- Reliable detection of changes in water content
- Supports consistent post-etch polymer removal
- Enables defined upper and lower process limits
- Supports automated replenishment or chemical spiking
- Reduces dependence on manual sampling
- Reduction of unnecessary EKC® consumption
- Early detection of process deviations
- Suitable for integration into automated semiconductor wet-process systems

Typical industries

- Semiconductor wafer fabrication
- Post-etch residue removal
- Spray solvent tools
- Wafer cleaning processes
- Chemical distribution and blending systems
- Process monitoring and fault detection
- Semiconductor process development and quality control

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