

Abstract Submitted
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In-situ diagnostics and characterization of etch by-product deposition on chamber walls during halogen etching of silicon NEEMA RASTGAR, SARAVANAPRIYAN SRIRAMAN, RICKY MARSH, ALEX PATERSON, Lam Research — Plasma etching is a critical technology for nanoelectronics fabrication, but the use of a vacuum chamber limits the number of in-situ, real-time diagnostics measurements that can be performed during an etch process. Byproduct deposition on chamber walls during etching can affect the run-to-run performance of an etch process if there is build-up or change of wall characteristics with time. Knowledge of chamber wall evolution and the composition of wall-deposited films are critical to understanding the performance of plasma etch processes, and an in-situ diagnostics measurement is useful for monitoring the chamber walls in real time. We report the use of attenuated total reflectance Fourier transform infrared spectroscopy (ATR-FTIR) to perform in-situ diagnostics of a vacuum chamber's walls during plasma etching. Using ATR-FTIR, we are able to monitor the relative thickness and makeup of chamber wall deposits in real time. We then use this information to develop a chamber wall cleaning process in order to maintain reproducible etching conditions from wafer to wafer. In particular, we report mid-IR ($4000\text{-}650\text{ cm}^{-1}$) absorption spectra of chamber wall-deposited silicon byproducts formed during halogen etching of silicon wafers.

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