

Abstract Submitted
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Monitoring Ion Energy at a Wafer Surface During Plasma Etching MARK SOBOLEWSKI, NIST — A better understanding and control of plasma etching could be obtained if the energy distributions of ions striking the wafer surface were known. Unfortunately, directly measuring ion energies at a wafer surface during etching is difficult or impossible. Ion energies can be indirectly monitored, however, by measuring the rf voltage and current applied to a plasma reactor and analyzing these measurements with sheath models. This approach has previously been validated¹ and used to monitor ion energy drift² at a bare metallic electrode. When a wafer is present, however, it contributes an electrical impedance which may cause errors in the monitoring technique. In this study experiments were performed to characterize the wafer impedance and its effect on the monitoring technique, for oxidized and bare Si wafers being etched by Ar/CF₄ plasmas in an inductively coupled plasma reactor. Wafer impedance was found to be significant at low bias frequencies but negligible at high bias frequencies (10 MHz). At 10 MHz, the technique was able to accurately monitor ion energy during a normal etch process and during simulated equipment faults.

¹M. A. Sobolewski, J. Appl. Phys. **95**, 4593 (2004).

²M. A. Sobolewski, J. Appl. Phys. **97**, 033301 (2005).

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