

Real-Time Endpoint Detection for SiO₂ Film Plasma Etching Using Impedance Analysis with Modified Principal Component Analysis

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Plasma etching is used in various semiconductor processing steps. Commonly, optical emission spectroscopy is widely used for real-time endpoint detection for plasma etching. In this research, the object is to investigate the suitability of using impedance analysis for real-time endpoint detection. The endpoint were determined by impedance signal variation from I-V monitor. However, the signal variation at the endpoint is too weak to determine endpoint when SiO₂ film on Si wafer is etched by Ar and CF₄ plasma on inductive coupled plasma (ICP) etcher. Therefore, modified principal component analysis (mPCA) is applied to them for increasing sensitivity. From impedance data, we tried to analyze physical properties of plasma, and real-time endpoint detection can be achieved. This method can be applied to the other fault detections.