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Real-Time Endpoint Detection for SiO₂ Film Plasma Etching Using Impedance Analysis with Modified Principal Component Analysis HAEGYU JANG, DAEKYOUNG KIM, SKKU Advanced Institute of Nanotechnology, Sungkyunkwan University, KYOUNGHOON HAN, Semiconductor R&D center, Samsung Electronics CO. LTD, HEEYEOP CHAE, Department of Chemical Engineering, Sungkyunkwan University — 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 measurement and an equivalent circuit model. Especially, third harmonic changed sharply at the endpoint when SiO₂ film on Si wafer is etched by CF₄ plasma on capacitive coupled plasma. And modified principal component analysis (PCA) is applied to them for increasing sensitivity. For verifying this method, detected endpoint from impedance analysis is compared with optical emission spectroscopy and ion current probe, 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.

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