

P2-008

## Modified Principal Component Analysis for In-situ Endpoint Detection of Dielectric Layers Etching Using Plasma Impedance Monitoring and Self Plasma Optical Emission Spectroscopy

Haegyung Jang<sup>1</sup>, Sanghyuk Choi<sup>2</sup>, Heeyeop Chae<sup>1,2,\*</sup>

<sup>1</sup>성균관대학교 나노과학기술협동학부, <sup>2</sup>성균관대학교 화학공학부

Plasma etching is used in various semiconductor processing steps. In plasma etcher, optical emission spectroscopy (OES) is widely used for in-situ endpoint detection. However, the sensitivity of OES is decreased if polymer is deposited on viewport or the proportion of exposed area on the wafer is too small. Because of these problems, the object is to investigate the suitability of using plasma impedance monitoring (PIM) and self plasma optical emission spectroscopy (SPOES) with statistical approach for in-situ endpoint detection. The endpoint was determined by impedance signal variation from I-V monitor (VI probe) and optical emission signal from SPOES. However, the signal variation at the endpoint is too weak to determine endpoint when SiO<sub>2</sub> and SiN<sub>x</sub> layers are etched by fluorocarbon on inductive coupled plasma (ICP) etcher, if the proportion of SiO<sub>2</sub> and SiN<sub>x</sub> area on Si wafer are small. Therefore, modified principal component analysis (mPCA) is applied to them for increasing sensitivity. For verifying this method, detected endpoint from impedance monitoring is compared with optical emission spectroscopy.

**Keywords:** Endpoint Detection, Plasma Impedance Monitoring, Self Plasma Optical Emission Spectroscopy, Principal Component Analysis, Plasma Etching