Fault Detection of Plasma Etching Processes with OES and Impedance at CCP Etcher

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Fault detection was carried out in an etcher of capacitive coupled plasma with OES (Optical Emission Spectroscopy) and impedance by VI probe that are widely used for process control and monitoring at semiconductor industry. The experiment was operated at conventional Ar and Fluorocarbon plasma with variable change such as pressure and addition of N2 and O2 to assume atmospheric leak, RF power and pressure that are highly possible to impact wafer yield during wafer process, in order to observe OES and VI Probe signals. The sensitivity change on OES and Impedance by VI probe was analyzed by statistical method including PCA to determine healthy of process. The main goal of this study is to find feasibility and limitation of OES and Impedances for fault detection by shift of plasma characteristics and to enhance capability of fault detection using PCA.

Keywords: Fault Detection, optical emission spectroscopy, Impedance, CCP, PCA