

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

SangHyuk Choi¹, HaeGyu Jang², HeeYeop Chae^{1,2}

¹School of Chemical Engineering, Sungkyunkwan University Suwon, 440-746,

²SKKU Advanced Institute of Nanotechnology (SAINT), Sungkyunkwan University, Suwon 440-746, Korea

Fault detection was carried out in a 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