

Abstract Submitted
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Real time multi-dimensional control in a two-frequency, confined plasma etcher VLADIMIR MILOSAVLJEVIC, ANDREY M. ISLYAIKIN, CEZAR GAMAN, ALBERT R. ELLINGBOE, Plasma Research Laboratory, NCPST, Dublin City University, Dublin 9, Ireland — Multi-dimensional control of plasma processes is of interest for reducing excursions in semiconductor manufacturing. Key parameters for plasma etching of dielectric films include ion-flux and gas-density of oxygen containing species in the plasma. The ion-flux is measured by with an isolated collection area built into the electrode surface, biased to -18Volts. Density of chemical species are measured using Mass-spectrometry or OES/Actinometry. The response-surface of the sensors in the process-space was collected over the process space. Sensor signals are not orthogonal, and do not directly map onto the input control parameters. The sensor data is compared to external setpoints for ion flux and chemical density. The functional dependencies of the response-surface, in conjunction with simple physical models, are used to deconvolute the sensor signals onto the control parameters. In this paper we demonstrate real-time control of ion-electrode-flux independent of plasma chemistry (O, O₂, CO, or CO₂) in a modified Exelan chamber (Lam Research). The control is stable to external perturbations to the operating point of the chamber.

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