Abstract Submitted
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Optical emission study of ion composition in an inductively coupled oxygen plasma[1] NATHANIEL LY, JOHN B. BOFFARD, CHUN C. LIN, AMY WENDT, University of Wisconsin-Madison, SVETLANA RADOVANOV, HAROLD PERSING, ALEXANDRE LIKHANSKII, Applied Materials, Silicon Systems Group, Varian Semiconductor Equipment — The success of ion implantation to precisely modify substrate properties requires control of the incident ion energies to achieve the desired depth of the implanted ions. Oxygen plasmas generally contain both O^+ and O_2^+ ions, and in plasma immersion ion implantation (PIII) of oxygen, the two will produce different concentration depth profiles due to their different energy/mass ratios. Predicting the overall profile thus requires knowledge of the relative fluxes of the two ion species. Here we combine experiment and modeling to investigate the feasibility of using non-invasive optical emission spectroscopy (OES) to monitor O^+ and O_2^+ abundances in an oxygen inductively-coupled plasma. Measurements of multiple O, O_2, O^+, and O_2^+ emission line intensities were made as a function of pressure (1-30 mTorr) and power (500-2000 W). While the O_2^+ emissions were relatively intense, the O^+ emissions were very weak for all conditions examined. Emissions from both ion species were highest at low pressures and at the highest power levels, but the O^+ / O_2^+ emission ratio varied little with plasma conditions.

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