Abstract Submitted
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Study of excitation and emission features in low pressure electronegative oxygen discharges with special regard to the actual electrode surface condition[1] ARTHUR GREB, KARI NIEMI, DEBORAH O'CONNELL, TIMO GANS, York Plasma Institute, University of York, YO10 5DD, York, UK — The presented study is based on a one-dimensional semi-kinetic fluid modelling approach, which accounts for a geometrical asymmetry of the radio frequency driven capacitively coupled oxygen plasma. The plasma is operated at a pressure of 40 Pa and with a sinusoidal driving voltage of 300 V amplitude. A simple plasma chemistry is accounted for including electrons, molecular oxygen positive ions (O_2^+), atomic oxygen negative ions (O^-) and metastable singlet delta oxygen ($O_2(^1\Delta)$). The actual electrode surface condition, which strongly affects the plasma-surface interaction processes, is varied in the model by means of changing the secondary electron emission yield from positive ions and the surface loss probability of metastable singlet delta oxygen. It is found that both factors significantly affect plasma parameters, such as the metastable concentration, electronegativity, spatial particle distribution as well as the excitation and ionization dynamics. Excitation pattern generated from simulations are then used to calculate the optical emission signal, which can directly be compared with phase resolved optical emission spectroscopy measurements. By correlating both simulations and experimental measurements plasma and electrode surface parameters can be predicted.

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