Abstract Submitted
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Experimental and computational investigations of the electrode gap length effect on capacitively coupled radio frequency oxygen discharges[1] HYO-CHANG LEE, K. H. YOU, Korea Research Institute of Standards and Science, J. SCHULZE, Ruhr-University Bochum, West Virginia University, A. DERZSI, Hungarian Academy of Sciences, West Virginia University, Z. DONKO, Hungarian Academy of Sciences, H. J. YEOM, Korea Research Institute of Standards and Science, Chungnam National University, J. H. KIM, D. J. SEONG, Korea Research Institute of Standards and Science — Geometrically symmetric capacitively coupled oxygen plasmas are studied via experiments and Particle-in-Cell/Monte Carlo collision simulations [1]. The experiments reveal that the central electron density increases with an increased electrode gap, while the time averaged optical emission of atomic oxygen lines decreases. The simulations show that the electron density increases due to a mode transition from the Drift-Ambipolar-mode to the alpha-mode induced by increasing the electrode gap. This mode transition is due to a drastic change of the electronegativity and the mean electron energy. The observed mode transition is also found to cause a complex non-monotonic dependence of the O2 ion flux to the electrodes as a function of the electrode gap. These fundamental results are correlated with measurements of the etch rate of amorphous carbon layers at different gap distances. [1] Phys. Plasmas 26, 013503 (2019)

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