

Abstract Submitted
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Role of metastable molecules and negative ions in dc and rf oxygen discharges GORDON K. GRUBERT, DETLEF LOFFHAGEN, FLORIAN SIGENEGER, INP Greifswald, Felix-Hausdorff-Str. 2, 17489 Greifswald, Germany — For various technological oxygen plasma applications it is supposed that the metastable molecules play a decisive role for the charge carrier production and consequently, the negative ions deform the electric potential intensely. To analyze the influence of these species, a self-consistent theoretical description for an oxygen discharge between plane electrodes has been performed. A hydrodynamic approach including the continuity equations for the particle densities in addition with the drift-diffusion approximation for the fluxes of all relevant species coupled with Poisson's equation for the determination of the space-charge field has been adapted. The electronic transport and rate coefficients are determined by solving the stationary, spatially homogeneous electron Boltzmann equation in multiterm approximation. The pressure range from 10 to 100 Pa has been investigated for typical dc and rf discharge conditions. It was found that the metastable molecule densities are orders of magnitude smaller than expected and their spatial profiles are similar to diffusion profiles. Furthermore, the influence of the negative ions on the electric potential is found to be negligible. This work is supported by the Deutsche Forschungsgemeinschaft within SFB TR 24.

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