

Abstract Submitted
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Mode transitions and electronegativity in oxygen CCP and ICP.¹

JUERGEN MEICHSNER, THOMAS WEGNER, University of Greifswald — Mode transitions in 13.56 MHz oxygen radio frequency plasmas (CCP, ICP) and their impact on the electron heating mechanisms and electronegativity were studied by advanced plasma diagnostics. In particular, Langmuir probe measurements, Gaussian beam microwave interferometry (160 GHz) coupled with laser photodetachment of negative oxygen ions, as well as the (phase resolved) optical emission and VUV absorption spectroscopy, and ion mass spectrometry are taken into consideration. With increasing RF power a transition between high and low electronegativity was found both in CCP and ICP discharge configuration. Thereby, the changed electron heating mechanisms, e.g., the alpha-gamma mode transition in CCP and the E-H mode transition in ICP is combined with the change of electronegativity. In strongly asymmetric CCP at moderate pressure the emission of secondary negative ions at the powered electrode have to be considered, too. Thereby, pseudo secondary electrons may be produced due to collision detachment of negative ion by metastables. During the E-H mode transition in oxygen ICP, the increasing gas temperature and the metastables influences significantly the oxygen kinetics.

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Juergen Meichsner
University of Greifswald

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