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Electron heating and electronegativity during E-H transition in inductively coupled RF oxygen discharge[1] THOMAS WEGNER, CHRISTIAN KÜLLIG, JÜRGEN MEICHSNER, University of Greifswald — The E-H transition of a planar inductively coupled RF oxygen discharge was investigated using the phase resolved optical emission spectroscopy. Beside of experimental methods, an analytical calculation of the negative ion density using a particle balance equation reveals an information about the electronegativity, too. The E-mode at low RF power is characterized by RF sheath heating during the sheath expansion and the electrical field reversal which appears during the sheath collapse. The last one is a sign for high electronegativity. The axial distance of the maximum excitation rate increases due to the increasing sheath thickness. The E-H transition in this exemplary discharge is continuously and the electron heating changes smoothly. During the transition into the H-mode the capacitive and inductive heating are present and a hybrid mode is observed. Further, the electronegativity is reduced. As a result of the shrinking sheath thickness and skin depth, the axial distance of the maximum excitation rate decreases drastically. In the pure H-mode two separated patterns appear representing the electron heating for each half cycle. Due to the increases of the electron density, the skin depth drops and leads to a further decrease of the axial distance of the maximum excitation rate.

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