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Electron energy balance analysis of ccrf discharge plasmas in oxygen[1] IGOR SHEYKIN, MARKUS M. BECKER, DETLEF LOFFHAGEN, INP Greifswald, Felix-Hausdorff-Str. 2, 17489 Greifswald, Germany — In capacitively coupled radio frequency (ccrf) oxygen plasmas at low pressure the mean electron energy is assumed to be a measure for etching, deposition and other surface processes. Hence, it is important to know its spatio-temporal distribution, dependence on applied voltage and discharge parameters. Here, an axially and phase resolved analysis of the mean electron energy has been performed by means of fluid modelling for discharge plasmas in a reactor with plane parallel electrodes. The model includes the coupled system of balance equations for heavy species, the electron component and the mean electron energy as well as Poisson's equation with the corresponding boundary conditions. The analysis has been done for pressures between 30 and 50 Pa, applied voltage amplitudes from 100 to 500 V and a frequency of 13.56 MHz. The impact of the different contributions to the electron energy balance is discussed. In particular, it was found that the ratio between energy gain due to Joule heating and energy flux in the plasma bulk depends strongly on the applied voltage and pressure of the gas.

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