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The Influence of γ- and δ-Electrons on the Nonlocal Power Absorption in Capacitively Coupled Plasmas KATHARINA NOESGES, Ruhr University Bochum, Germany, ARANKA DERZSI[1], BENEDEK HORVATH, Wigner Research Centre for Physics, Budapest, Hungary, JULIAN SCHULZE[2], Ruhr University Bochum, Germany, THOMAS MUSSENBROCK, Brandenburg University of Technology, Cottbus, Germany, RALF PETER BRINKMANN, SEBASTIAN WILCZEK, Ruhr University Bochum, Germany — The generation of secondary electrons (SEs) in low pressure capacitively coupled radio frequency (CCRF) discharges is one part of the plasma surface interaction which strongly affects the electron dynamics. However, SEs, in particular electron induced SEs (δ-electrons), are frequently neglected in theory and simulations. Especially at small gap sizes and high sheath voltages, the δ-electrons dominate the ionization process and can significantly increase the plasma density. With the separation of γ-electrons and δ-electrons, the electron power gain as well as the generation of each species can be understood on a nanosecond timescale. In order to study this issue, 1d3v particle-in-cell/Monte Carlo collisions (PIC/MCC) simulations of a symmetric CCRF discharge are performed in the low pressure regime ($p \approx 1$ Pa). In this work, the gap size is varied and the effects of the nonlocal and nonlinear dynamics of γ-electrons and δ-electrons on the discharge are investigated by using a realistic model for the electron-surface interactions. It is shown, that particularly for small gap sizes ($L_{\mathrm{gap}} < 30$ mm) the δ-electrons dominate the discharge population of electrons in the range of 50%.

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