Abstract Submitted
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PIC Simulations of Atmospheric Pressure Capacitive RF He/N_2 Discharges[1] E. KAWAMURA, M.A. LIEBERMAN, A.J. LICHTENBERG, University of California, Berkeley, C. LAZZARONI, Universite Paris 13, P. CHABERT, Ecole Polytechnique — Atmospheric pressure rf micro-discharges have been extensively studied, due to emerging applications, particularly in medical and related areas. Because of their small size, diagnostics are difficult. A previous work studied discharges with a helium feed gas and small admixture of N_2 by using a 1D hybrid analytical-numerical model [1]. But this model did not consider sheath breakdown phenomena, thus limiting its applicability to the lower power range. To overcome this, we perform 1D particle-in-cell (PIC) simulations of atmospheric pressure capacitve RF He/N_2 discharges and use the results to guide the development of a model for the γ mode of the discharge. We noted from [1] that the dominant species in He/N_2 discharges with 0.1% N_2 were N_2^+ ions, electrons, and metastable helium atoms He^*. This enabled us to develop a simplified cross-section set only involving those three species.

[1] C. Lazzaroni, P. Chabert, M.A. Lieberman, A.J. Lichtenberg and A. Leblanc, Plasma Sources Sci. Technol. **21**, 035012 (2012).

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