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Frequency dependence of the Electrical Asymmetry Effect in electronegative capacitive RF discharges driven by Tailored Voltage Waveforms JULIAN SCHULZE, Department of Physics, West Virginia University, Institute for Electrical Engineering, Ruhr-University Bochum, EDMUND SCHUENGEL, Department of Physics, West Virginia University, BASTIEN BRUNEAU, ERIC JOHNSON, JEAN-PAUL BOOTH, Ecole Polytechnique, ARANKA DERZSI, ZOLTAN DONKO, Hungarian Academy of Sciences, DEBORAH O'CONNELL, TIMO GANS, York Plasma Institute — Capacitively coupled RF plasmas operated in CF_4 at 80 Pa and driven by voltage waveforms composed of four consecutive harmonics are investigated for different fundamental driving frequencies (2.86 - 13.56 MHz) using PIC/MCC simulations and an analytical model. In contrast to previous findings in electropositive discharges the absolute value of the DC self-bias generated via the Electrical Asymmetry Effect for peak waveforms is found to increase as the fundamental frequency is reduced, providing an increased range over which it can be tuned by phase control. The analytical model reveals that this increased DC self-bias is caused by changes in the spatial profile and the mean value of the net charge density in the grounded electrode sheath induced by varying the fundamental driving frequency for peak waveforms. The spatio-temporally resolved simulation data show that as the frequency is reduced the grounded electrode sheath region becomes electronegative. This strongly affects the electron power absorption dynamics and the discharge symmetry.

Julian Schulze
Department of Physics, West Virginia University, Institute for Electrical Engineering, Ruhr-University Bochum

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