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Resonance induced striations in electronegative capacitively coupled radio-frequency plasmas[1] EDMUND SCHUENGEL, Evatec AG, Switzerland, YONG-XIN LIU, School of Physics and Optoelectronic Technology, Dalian University of Technology, China, IHOR KOROLOV, ZOLTAN DONKO, Institute for Solid State Physics and Optics, Wigner Research Centre for Physics, Budapest, Hungary, JULIAN SCHULZE, Institute for Electrical Engineering, Ruhr-University Bochum, Germany, YOU-NIAN WANG, School of Physics and Optoelectronic Technology, Dalian University of Technology, China — The eigenfrequency of capacitively coupled radio-frequency plasmas in electronegative gases may locally match the frequency of the applied voltage. Such a resonance leads to a spatial modulation of the electric field, the densities of positive and negative ions, the energy gain of electrons, and the optical emission intensity in the plasma bulk region. Accordingly, self-organized striation patterns emerge. We investigate these striations and the physical mechanisms behind them in capacitive discharges in CF$_4$ by a combination of Phase Resolved Optical Emission Spectroscopy measurements and outcomes of PIC/MCC simulations for various neutral gas pressures, electrode gaps, and applied voltage frequencies and amplitudes. The distance between the striations is found to decrease as a function of pressure. Furthermore, the discharge modes and mode transitions depending on the global control parameters are mapped in a phase diagram.

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