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Experiment, simulation, and model investigations on capacitive oxygen rf discharges driven by two consecutive frequencies EDMUND SCHUENGEL, Ruhr-University Bochum, QUAN-ZHI ZHANG, Dalian University of Technology, China, SHINYA IWASHITA, JULIAN SCHULZE, Ruhr-University Bochum, LU-JING HOU, Max Planck Institute for Extraterrestrial Physics, Germany, YOU-NIAN WANG, Dalian University of Technology, China, UWE CZARNETZKI, Ruhr-University Bochum — Using the combination of a fundamental frequency and its second harmonic (e.g. 13.56 MHz + 27.12 MHz), the symmetry of capacitive discharges is controlled by the phase between the two frequencies. Here, this concept is studied in an electronegative oxygen discharge by an experiment, a PIC/MCC simulation, and an analytical model. The results show that the generation of a dc self-bias is controlled via the phase. Meanwhile, the dissipated power and the total densities are kept constant. At low pressure, the self-excitation of plasma series resonance oscillations occurring due to the electrical asymmetry leads to resonance structures inside the plasma bulk. Funding: German Federal Ministry for the Environment (0325210B), Alexander von Humboldt Foundation, RUB Research Department Plasma, National Natural Science Foundation of China (Grant No. 10635010), and Research Fund for Doctoral Program of Higher Education of China (Grant No. 20090041110026).

Edmund Schuengel
Ruhr-University Bochum

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