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Ionisation dynamics and frequency coupling in dual frequency capacitively coupled plasmas D. O'CONNELL, Centre for Plasma Science and Technology, Ruhr University Bochum, Germany, T. GANS, Centre for Plasma Physics, Queen's University Belfast, Northern Ireland, E. SEMMLER, P. AWAKOWICZ, Centre for Plasma Science and Technology, Ruhr University Bochum, Germany, A.R. ELLINGBOE, M.M. TURNER, National Centre for Plasma Science and Technology, Dublin City University, Ireland — Multi-frequency discharges can provide additional process control for technological applications. Plasma ionization and sustaining mechanisms are investigated in an asymmetric capacitively coupled radio-frequency (rf) discharge operated with 2 MHz and 14 MHz applied simultaneously to the same electrode. Energetic electrons, key to ionization mechanisms, are probed using phase resolved optical emission spectroscopy (PROES) resolving both the low and high frequency rf cycles. The electron dynamics exhibits a complex spatio-temporal structure. The observed dynamics is compared to particle-in- cell (PIC) simulations. Pronounced coupling effects of the two frequencies can be observed, in particular, when they are phase locked. The relative phase between the two frequencies and the ratio of the applied voltages determines details of the electron dynamics. Plasma ionization mechanisms can be controlled and tailored through variations of the relative phase and the voltage ratio. Funding: SFB 591, ProInno II, GRK 1051, EPSRC.

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