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Electron heating and ionisation mechanisms in dual-frequency capacitively coupled radio-frequency discharges[1] TIMO GANS, JULIAN SCHULZE, DEBORAH O'CONNELL, UWE CZARNETZKI, Institute for Plasma and Atomic Physics, CPST, Ruhr-University Bochum, Germany, BERT ELLINGBOE, MILES TURNER, NCPST, Dublin City University, Ireland — Despite its technological importance, the complexity of power coupling mechanisms in radio-frequency (rf) discharges is not yet fully understood. Insight into power dissipation requires temporal resolution on various time scales, in particular the dynamics within the rf cycle. Electron dynamics and ionisation mechanisms in dual-frequency capacitively coupled rf discharges is investigated using phase resolved optical emission spectroscopy (PROES), resolving both the high (27.12 MHz) and low (1.94 MHz) frequency rf cycles, and particle in cell (PIC) simulations. The electron dynamics exhibits a complex spatio- temporal structure. Excitation and ionisation, and, therefore, plasma sustainment is dominated through directed energetic electrons created through the dynamics of the plasma boundary sheath. These electrons propagate through the discharge volume with finite velocity, and are predominantly produced during contraction of the low frequency sheath - not during the sheath expansion when power dissipation is highest.

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