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**Electron and ion dynamics in a multi-frequency low-pressure asymmetric capacitively coupled oxygen plasma** ANDREW GIBSON, Centre for Plasma Physics, Queen's University Belfast, ARTHUR GREB, York Plasma Institute, University of York, WILLIAM GRAHAM, Centre for Plasma Physics, Queen's University Belfast, TIMO GANS, York Plasma Institute, University of York
— Multi-frequency plasma sources are widely used in industrial processes. Most current implementations apply two significantly differing frequencies to avoid coupling between the frequency components and achieve separate control of electron and ion dynamics. However, at very high driving frequencies plasma non-uniformities may be produced as a result of electromagnetic effects involving the high-frequency component. Thus further investigation and understanding of the coupling between multiple lower frequencies, where electromagnetic effects are minimised is warranted. Presented here is a study of a capacitively coupled oxygen plasma using a voltage waveform comprised of multiple frequencies below the threshold required to induce significant electromagnetic effects in current generation plasma processing reactors. Plasma dynamics are simulated using a hybrid model of an asymmetric CCP. Simulations are performed in time over a 1D spatial domain across the discharge centre. The asymmetry in the model is comparable to our experimental setup (GEC reference cell). The effect of variations in the relative amplitude of each frequency component and also in the phase difference between the components on electron and ion dynamics within the excitation cycle is investigated and discussed.

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