Abstract Submitted
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Influence of the normal modes on the plasma uniformity in large scale CCP reactors.[1] DENIS EREMIN, RALF PETER BRINKMANN, THOMAS MUSSENBROCK, Ruhr University Bochum, BARTON LANE, MASAAKI MATSUKUMA, PETER VENTZEK, Tokyo Electron Ltd. — Large scale capacitively coupled plasmas (CCP) driven by sources with high frequency components often exhibit phenomena which are absent in relatively well understood small scale CCPs driven at low frequencies. Of particular interest are such phenomena which affect discharge parameters of direct relevance to the plasma processing applications. One of such parameters is plasma uniformity. By using a self-consistent 2d3v Particle-in-cell/Monte-Carlo (PIC/MCC) code parallelized on GPU we have been able to show that uniformity of the plasma generated is influenced predominantly by two factors, the ionization pattern caused by high-energy electrons and the average temperature of low-energy plasma electrons. The heating mechanisms for these two groups of electrons appear to be different leading to different transversal (radial) profiles of the corresponding factors, which is well captured by the kinetic PIC/MCC code. We find that the heating mechanisms are intrinsically connected with excitation of normal modes inherent to a plasma-filled CCP reactor. In this work we study the wave nature of these phenomena, such as their excitation, propagation, and interaction with electrons.

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