Abstract Submitted
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Spatio-temporal analysis of the electron power absorption in electropositive capacitive RF plasmas based on moments of the Boltzmann equation[1] JULIAN SCHULZE, Ruhr-University Bochum, ZOLTAN DONKO, Hungarian Academy of Sciences, TREVOR LAFLEUR, PlasmaPotential - Physics Consulting and Research, SEBASTIAN WILCZEK, RALF PETER BRINKMANN, Ruhr-University Bochum — We present an analysis that provides a detailed understanding of the spatio-temporal electron power absorption dynamics in low pressure electropositive capacitive RF plasmas. The method is based on the moments of the Boltzmann equation, takes input quantities from kinetic PIC/MCC simulations, and does not use any ad-hoc assumptions. It allows the identification of *all* physical mechanisms and an accurate quantification of their contributions. In contrast to some widely accepted previous models we find that high space- and time-dependent ambipolar electric fields outside the sheaths play a key role in the electron power absorption. This ambipolar field is time-dependent within the RF period and temporally asymmetric, i.e., the sheath expansion is not a 'mirror image' of the sheath collapse. This time-dependence is mainly caused by a time modulation of the electron temperature resulting from the energy transfer to electrons by the ambipolar field itself during sheath expansion. This mechanism of electron power absorption, which is markedly different from the Hard Wall Model, is of key importance for energy transfer to electrons on time average and is essential for the generation of capacitively coupled plasmas.

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