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Experimental investigation of the generation of multiple electron beams during the sheath expansion phase in capacitive RF plasmas
BIRK BERGER, BTU Cottbus-Senftenberg, Germany; Ruhr-University Bochum, Germany, KWANG-HO YOU, Semiconductor RD Center, Samsung Electronics Co., Ltd., Republic of Korea, HYO-CHANG LEE, Korea Research Institute of Standards and Science, Republic of Korea, THOMAS MUSSENBROCK, BTU Cottbus-Senftenberg, Germany, PETER AWAKOWICZ, JULIAN SCHULZE, Ruhr-University Bochum, Germany — The fundamental investigation of different plasma heating modes is important in order to fully understand their physical nature, as well as to optimize technological applications of plasmas. We operate a geometrically symmetric capacitively coupled radio-frequency discharge in a regime of comparably low plasma density. Phase Resolved Optical Emission Spectroscopy provides insights into the electron power absorption dynamics under these conditions. By reducing the applied voltage amplitude, we observe additional electron beams, which are generated within a single phase of sheath expansion at a given electrode. This effect has been predicted by Particle in Cell simulations before and contradicts existing models that assume the generation of a single beam per sheath expansion phase by stochastic heating. Here, a systematic experimental study of the effect is presented.

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