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Control of electron velocity distributions at the wafer in low pressure high voltage capacitively coupled discharges by Voltage Waveform Tailoring[1] LI WANG, K. NÖSGES, B. BERGER, S. WILCZEK, R. P. BRINKMANN, J. SCHULZE, Ruhr-University Bochum, Z. JUHASZ, University of Pannonia, E. LEE, Samsung Electronics Co., T. MUSSENBROCK, Brandenburg University of Technology, Z. DONKÓ, A. DERZSI, P. HARTMANN, Wigner Research Centre for Physics — By Particle-In-Cell/Monte Carlo collision simulations of capacitive RF discharges operated in argon at low pressure and at high voltages, we demonstrate that tailoring the driving voltage waveform allows to generate high fluxes of energetic electrons towards one of the electrodes. These electrons impinge vertically on the wafer with velocities well above 3×10^6 m/s and can, thus, penetrate deeply into high aspect ratio etch features to compensate positive surface charges inside these structures. This is achieved by generating electric field reversals during sheath collapse at the wafer by tuning the driving voltage waveform. The effects of the peak-to-peak voltage, number of harmonics, and the duty-cycle on the electron velocity distribution at the wafer are clarified for peaks-, valleys-, and square-shape-waveforms.

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