Abstract Submitted
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Student Excellence Award Finalist: A potential remedy for etched trench deformations based on voltage waveform tailoring and electric field reversal[1] FLORIAN KRGER, Brandenburg University of Technology Cottbus-Senftenberg, SEBASTIAN WILCZEK, Ruhr University Bochum, THOMAS MUSSENBOCK, Brandenburg University of Technology Cottbus-Senftenberg, JULIAN SCHULZE, Ruhr University Bochum — The etching of sub micrometer high-aspect-ratio (HAR) features into dielectric materials in technological radio frequency plasmas is limited by the accumulation of positive surface charges inside etch trenches, causing reduced etch rates and feature deformations. These charge effects are, at least partially, caused by a difference in angle and velocity distributions of ions and electrons. Here, we demonstrate that using Voltage Waveform Tailoring, electric field reversals adjacent to the wafer can be generated and used to accelerate electrons into HAR features and compensate positive surface charges. Based on 1d3v Particle-in-Cell/Monte Carlo simulations of a capacitively coupled plasma operated in argon at 1 Pa, we study the effects of different voltage waveforms on this electric field reversal as well as on the electron velocity and angular distribution function at the wafer. We find that the angle of incidence of electrons relative to the surface normal can be strongly reduced and the electron velocity perpendicular to the wafer can be significantly increased by choosing appropriate waveforms.

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Florian Krger
Ruhr University Bochum

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