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Computational Modeling of Ion Energy and Angular Distributions in Pulsed Source and Bias Plasmas ROCHAN UPADHYAY, KENTA SUZUKI, Esgee Technologies Inc., PETER VENTZEK, Tokyo Electron America, LAXMINARAYAN RAJA, The University of Texas at Austin, ALOK RANJAN, Tokyo Electron Miyagi — Accurate predictions of the Ion Energy and Angular Distributions (IEADFs), are essential for a range of critical applications in thin films deposition and etching. Ion generation and flux is determined by ionization rates that depend on reactor-level parameters. Ion energy and angle depends on the acceleration of the ions across the sheath, driven by potential differences governed by the spatial plasma distribution. The IEADF at the wafer surface sensitively depends on rare collisional events such as charge exchange and ion-neutral collisions during the ion's transit across the sheath. Using ion transport parameters computed using standard fluid modeling techniques can significantly misrepresent the actual IEADFs at surfaces. In this study we use a hybrid approach where we employ VizGlow^{TM}, a fluid based plasma solver, to simulate a (pulsed) Inductively Coupled Plasma (ICP) source with a (pulsed) RF bias. Then we use VizGrain, a companion particle solver, to compute the IEADFs using the test-particle approach. We study the effect of pressure, pulse width and duty cycle and the staggering of the source and bias pulsing cycles on the IEADFs using Argon plama. We compare the simulation results to measurements of IEADFs on a test plasma platform for validation purposes.

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