

Abstract Submitted
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Non-Perturbative Measurements of Silane-Ammonia Plasma Parameters and Correlation with Silicon Nitride Deposition Properties¹

ADAM STEINER, University of Michigan, DANIEL HOFFMAN, Advanced Energy, Inc., STEVEN SHANNON, NC State University — Plasma-enhanced chemical vapor deposition (PECVD) of thin solid films is a topic of interest as an enabling manufacturing technology for current and future industries. A series of silicon nitride deposition plasmas were generated on a laboratory-scale, capacitively coupled PECVD system under a variety of process conditions (pressure, flow, power, RF frequency) from silane-ammonia mixtures. Voltage-current measurements were recorded using an in-line RF probe; film thickness and uniformity were measured using ellipsometry. A multi-species plasma model was developed based on particle-energy balance and plasma circuit modeling to obtain time-resolved electron temperature, number density, and sheath voltage from the measured electrical data. The results of correlating average plasma parameters with deposition characteristics will be given, and the model for determining real-time parameters of a two-species plasma from VI measurements will be presented.

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