

Abstract Submitted
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Reactive radical production and transport analysis in ammonia-hydrogen-argon microwave plasmas TOSHIHIKO IWAO, Tokyo Electron Limited, PETER VENTZEK, Tokyo Electron America, ROCHAN UPADHYAY, Esgee Technologies Inc., LAXMINARAYAN RAJA, University of Texas Austin, KIYOTAKA ISHIBASHI, Tokyo Electron Limited — High quality conformal dielectric films are playing an ever increasing role in advanced semiconductor device and memory manufacturing. Plasma-enhanced atomic layer deposition (PEALD) meet both quality and throughput requirements. For dielectric film PEALD, the attributes of microwave plasmas are important for the prevention of wafer device damage that occurs when other plasmas are used. With its advantages, PEALD brings with it complexity. In this presentation we present the results from an investigation of radical species generation and transport phenomena using “VizGlow” [1] a multi-dimensional plasma simulation tool. In the computational model, the ammonia, hydrogen, and argon mixture plasma chemistry for silicon nitride deposition is based on work by Arakoni et.al. [2]. From our investigation we are able to show the important role radical-ion chemistry plays and relate these results to basic process properties.

[1] “VizGlow: Plasma Modeling Software for Multi-Dimensional Simulations of Non-Equilibrium Glow Discharge Systems” Theory Manual, version 2.1, Esgee Technologies Inc.

[2] Arakoni, et. al., J. Phys. D: Appl. Phys. 40 (2007) 2476-2490

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