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Spatiotemporal evolution of light scattering from growing nanoparticles in an RF argon-silane plasma[1] STEVEN GIRSHICK, PULKIT AGARWAL, Department of Mechanical Engineering, University of Minnesota, JOHANNES BERNDT, EVA KOVACEVIC, LAIFA BOUFENDI, GREMI, University of Orleans, France — Measurements were made of the spatial and temporal profiles of laser light scattering from silicon nanoparticles that nucleate and grow in a capacitively-coupled RF argon-silane plasma. The measurements are compared to simulation results of a 1-D plasma-aerosol numerical model. The plasma was operated at 13.56 MHz with a 4-cm electrode gap. Experiments and simulations were conducted for various pressures (in the 100-mTorr range), RF voltages and flow rates of argon and silane. A plasma fluid model is self-consistently coupled to a sectional aerosol model which considers particle nucleation and surface growth, coagulation, particle charging, and particle transport by neutral gas drag, ion drag, electrostatic forces and gravity. We discuss effects of system operating parameters, and areas of agreement as well as discrepancies between the numerical model and the experimental measurements.

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