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Computational framework for nanoparticle growth in low-temperature plasmas BENJAMIN SANTOS, FRANÇOIS VIDAL, CLAUDE BOUCHER, Institut National de la Recherche Scientifique, Varennes, Canada — We propose a framework to study nanoparticle growth in low-temperature plasmas. This system represents a challenge because of complexity:nanoparticles can accumulate charge, coagulate and grow while strongly coupled with the plasma. In analogy with aerosol physics, we describe the nanoparticle model using a General Dynamics Equation. In order to follow the evolution of nanoparticle size and charge distribution we must partition it in representative sizes and charges for each point in the spatial domain. Thus, for each combination of charge and size we need to calculate a drift-diffusion equation. As a case of study, we considered a radio frequency capacitively coupled plasma with an Argon-Silane gas mixture. Using a time slicing approach[1] we can separate the plasma calculations from nanoparticle model. Particle densities are calculated from a drift-diffusion equation with finite difference scheme and the flux calculated by a Scharfetter-Gummel method. Additionally,we decoupled the plasma density calculations and nanoparticle sources in chunks that can be solved using linear solvers with appropriate time step, instead of solving a coupled nonlinear system. Finally, applications to the proposed framework are discussed.

[1]P. Agarwal,**Plasma Sources Sci. Technol.** 21(5)

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