Abstract Submitted
for the DPP19 Meeting of
The American Physical Society

Numerical computation of the enhancement factor for the coagulation of silicon nanoparticles in low-temperature silane-argon plasmas BENJAMIN SANTOS, FRANÇOIS VIDAL, INRS-EMT — The coagulation enhancement factor was calculated numerically for nanoparticles of different sizes and charges under typical conditions in low-temperature argon-silane plasmas. We computed the electrostatic interaction between nanoparticles using a rigorous formulation in terms of the multipole coefficient expansion[1]. It is shown that coagulation is enhanced for neutral particles. Besides, the short-range force between nanoparticles of the same charge can become attractive. Furthermore, the potential calculated from the multipolar coefficients is compared to a more straightforward approximated analytical form. The second part of the results relates to the evolution of the size and charge distributions when the nanoparticles follow the processes of charging, coagulation, nucleation, and surface growth. The model could be easily extended to particles of other materials or in a 1D / 2D model configuration.

[1]Lindgren, E. B., et al. Phys. Chem. Chem. Phys. 18, 58835895 (2016).

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Date submitted: 28 Jun 2019 Electronic form version 1.4