

Abstract Submitted
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Modeling wrinkled-assisted assembly of ordered nanoparticles and nanorods on a wavy substrate¹ CAMILA LUPPI SATO, PETER YEH, ALEXANDER ALEXEEV, Woodruff School of Mechanical Engineering, Georgia Institute of Technology, MARTIN MAYER, PATRICK PROBST, ANDREAS FERY, Physical Chemistry II, University of Bayreuth, Germany — Wrinkle-assisted assembly is a technique that allows for fabrication of ordered structures of nanoparticles and nanorods on hydrophilic substrates. As an intermediate step in this process, nanoparticles are deposited within microscopically wrinkled surfaces, where they organize into patterned structures upon solvent evaporation. However, the dependence of the resulting pattern on nanoparticle concentration, particle size and shape, and substrate geometry is not well understood. We develop a model of the ordering process using dissipative particle dynamics (DPD) to predict the resulting nanostructures. We approximate the wavy sheet as a sinusoidal surface. One layer of DPD liquid containing nanoparticles fills the surface, while another layer of DPD fluid acts as the gaseous phase. We model the evaporative process by gradually replacing DPD liquid particles with DPD gaseous particles. The results of our work are useful in designing surface patterns that exhibit strong plasmonic coupling.

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