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**Lattice Boltzmann Model of Drop Dynamics on Patterned Substrates with Particle Suspensions** ABHIJIT JOSHI, YING SUN, State University of New York at Binghamton — A lattice Boltzmann method (LBM) model has been developed for multi-phase flows with solid particles suspended in the liquid and/or vapor phases. While significant research has been devoted to study multi-phase flows and particle suspensions separately, it is only recently that these separate threads are being combined. For the multi-phase part, the particle-interaction model of Shan and Chen is used. The particle suspension model is modified to incorporate surface forces between the suspended particle and the surrounding fluid, similar to the adhesive forces used in the multi-phase model near solid walls. Several validation problems are presented to test both the separate sub-models and the combined model. The combined multi-phase particle suspension model is first used to study clustering of colloidal particles within a liquid drop and migration of suspended particles from the bulk fluid region to the liquid-vapor interface. The model is then used to predict the wetting, dewetting, contact line pinning, and particle self-assembly of a drop containing suspended particles as it spreads on various types of substrates. In conjunction with experiments, the LBM model will help optimize inkjet printing of electronic inks on patterned substrates for flexible electronics fabrications.

Abhijit Joshi  
State University of New York at Binghamton

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