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Numerical Study of Particle Transport and Aggregates during Spin Coating of Ag Colloidal Suspension YONGLI ZHAO, Department of Mechanical and Manufacturing Engineering, St. Cloud State University, ALBERT RATNER, Department of Mechanical and Industrial Engineering, the University of Iowa, JEFFREY MARSHALL, School of Engineering, The University of Vermont — A multiple time-step discrete-element approach is employed to model the transport, collision and adhesion of small Ag colloidal particles in a spin coating process. The computations are used to predict particle distribution and wall adhesion during the non-evaporative phase of spin coating of a thin film, which is important for controlling the abrasiveness, opacity, conductivity, and other properties of the film, as well as for using the deposited particles for growing new materials (e.g., nanotubes). The computations examine the particle distribution and the effect of particle adhesive force on particle deposition during spin coating. Particles are observed to preferentially collect within the film ridge just behind the moving contact line. Increase in the particle adhesive force is observed to lead to enhanced deposition of particles within an inner radius of the film and increase in the aggregate size. The aggregate size decreases with higher rotational speed. A more uniform distribution of particles can be obtained by decreasing the rotational speed.

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