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**Rapid Convective Deposition For Fabrication of Microlens Arrays** JAMES GILCHRIST, PISIST KUMNORKAEW, Department of Chemical Engineering, Lehigh University, NELSON TANSU, YIK-KHOON EE, Department of Electrical and Computer Engineering, Lehigh University — Micron-sized microspheres were deposited into thin films via rapid convective deposition, similar to the 'coffee ring effect' using a similar method to that studied by Prevo and Velev, Langmuir, 2003. By varying deposition rate and blade angle, the optimal operating ranges in which 2D close-packed arrays of microspheres existed were obtained. Previous models do not consider the effect of blade angle and blade surface energy on the deposition rate. Using a confocal laser scanning microscope, dynamic self-assembly of colloidal particles under capillary force during solvent evaporation was revealed. The resulting microstructure controlled by varying the macroscale parameters and interaction between substrate and colloidal particles played an important role in formation of ordered crystalline arrays. These interactions were explored through a model comparing the residence time of a particle in the thin film and the characteristic time of capillary-driven crystallization to describe the morphology and microstructure of deposited particles. Fabricated microlens arrays assembled on LEDs using this process were demonstrated to enhance performance by 300%.

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