# Surface Patterning via Continuous Coating of Colloidal Suspensions

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Novel particulate coatings for flexible electronics, different display technologies and photonic devices require specific internal particle microstructure to function. Understanding and controlling the microstructure formation is key to eliminating defects and increasing production. These new products are typically developed in batch processes, in which the rheology, structuring, and drying or reactive curing are known poorly at best. The dream of developers is to have low-cost, high-speed continuous processing on flexible substrates unwound from a roll, coated by one of the precision pre-metered methods, solidified with close control of microstructure evolution from top to bottom, and wound into another roll. This work investigates coating a colloidal solution via slot coating with the intent of controlling the final particle microstructure.

In this study, we investigated the flow of colloidal suspensions in the coating-die chamber through visualization. The impact of important ratios such as the gap width to particle diameter is investigated. A novel method for hastening and controlling particle ordering after wet coating through the use of a vacuum-induced flow is also presented. This method involves the suction of a particle-laden solution through a porous substrate to induce ordering. Visualization experiments were performed to observe the effects of the process parameters of final particle microstructure.

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