

# **Rheology and solidification microstructure via mesoscale modeling of polydisperse particle suspensions**

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Cast colloidal particle dispersions are routinely used for the manufacture of electrode and other active layers of batteries, fuel cells, and related devices. The underpinning rheology of the coating process followed by the microstructure/morphology evolution upon drying are two critical fundamentals affecting process understanding and defect control. In this presentation a recently developed discrete element modeling capability will be described that enables these fundamentals to be addressed; the models and methods pertaining to colloidal particle interactions and the solvent hydrodynamics will be detailed. Verification and validation will be demonstrated using rheological measurements of a test system of charged polystyrene in water. We then apply the approach to the densification of a polydisperse system to examine microstructure and how it is affected by various physical rate processes.

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