Postdoctoctoral opportunities in understanding heat & mass transport in dense colloidal systems for energy technology applications

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Widespread availability of cost-effective electrochemical energy storage and conversion is urgently needed to facilitate growth of the renewable energy economy. In particular, electrodes and membranes for commercial batteries and fuel cells are typically manufactured by coating and drying particle suspension films on suitable substrates. Processing and drying these particle suspensions to ensure good product performance is costly, so tuning suspension preparation and processing variables can provide valuable opportunities for optimizing product manufacturing. However, optimization is often achieved in practice through trial-and-error, since the relationships among macroscopic film heat and mass transport behavior, suspension processing variables, and interactions among components in commercially-relevant suspensions are not well-understood. Conventional colloidal characterization techniques do not work because commercially relevant systems are highly dense as compared to typical colloidal systems investigated in the literature. The Energy Storage and Distributed Resources Division at Lawrence Berkeley National Laboratory, as part of a larger team of national labs, is working to address this gap in the science of manufacturing for these vitally important technologies. We seek a highly-motivated, team-oriented postdoctoral scholar who wants to explore fundamental questions of suspension film behavior including effect of microscale forces such as van der Waals, charged double layer and polymeric steric repulsion on heat and mass transfer in dense colloidal systems. The postdoctoral scholar is expected to develop novel experimental approaches for operando monitoring of critical processing steps, making use of a wide range of analytical tools available at LBNL, including synchrotron-based techniques at the Advanced Light Source, and imaging and spectroscopy capabilities at the Molecular Foundry.

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