

MIT Chemical Engineering Department Fall 2017 Seminar Series

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Towards Scalable Nanomanufacturing Using Capillarity



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3:00pm, refreshments at 2:45pm**

66-110

Abstract:

In this talk, I will describe new approaches for scalable manufacturing of nanocomposites by harnessing capillary interactions between nanoparticles and fluids. In the first part of this talk, I will describe our work on generating nanocomposite films with extremely high loadings of nanoparticles using capillary rise infiltration (CaRI). In CaRI, composites are formed by thermally annealing a bilayer of polymer and nanoparticle, which induces imbibition of polymer into the interstices of the nanoparticle packing. I will share our current understanding of the transport phenomena involved in CaRI. In the second part, I will describe our recent efforts in creating bicontinuous interfacially jammed emulsions (BIJELs), which are a new class of soft materials with potential applications in reactive separation, membrane separation and catalysis. We have developed a new method to enable continuous generation of bijels using solvent-transfer-induced phase separation (STRIPS). Transport of molecules with opposite polarity as well as membrane separation of nanoparticles using STRIPS bijels will be demonstrated.