Department of Materials Science and Engineering
Candidacy Exam

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https://drexel.zoom.us/j/82656600803

Microstructure Formation in Drying of Colloidal Thin Films
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Abstract:

Composite battery electrode thin films consist of an active material, conductive additive (often carbon black) and polymer binder in solvent. Understanding the physics behind the microstructure evolution of these electrode thin films is crucial for the commercialization of novel electrodes. Microstructure formation in monodisperse colloidal thin films (e.g. carbon black and solvent) is governed by the forces of evaporation, diffusion and sedimentation. Adding a soluble polymer (e.g. binder) to the film changes drying physics by increasing the viscosity of the solution. In a polydisperse colloidal film (e.g. active material and carbon black), particle segregation occurs due to increased susceptibility for motion via osmotic pressure gradients with increasing size. This talk will be exploring the different phenomena that govern microstructure formation in thin films starting from a simple binary system of monodisperse colloids in solvent, progressively adding complexity until inactive material migration in electrode films can be explained.