

Graduate Student Research Seminar

Fall 2022

Tunable Filtration of Particles During Dip-Coating

Connor Copeland (MS student)

Advisor: Dr. Joshua Bostwick

Monday, September 19th

3:00 pm (EST) – 132 Fluor Daniel Building



Abstract

When a solid substrate is withdrawn from a liquid bath a thin coating is deposited whose thickness is given by the Landau–Levich–Derjaguin (LLD) law. We perform an experimental study of dip coating of particle suspensions showing that particles of a given size can become entrained in the meniscus by the competition between viscous and surface tension forces. This is called capillary filtration and can be used as a tunable dynamic filter. For single particle suspensions, filtration can be in terms of either clumps or single particles, with the relevant entrainment points depending upon the rheology of the working fluid, either Newtonian silicone oil or non-Newtonian shear-thinning xanthan gum solution. For bi-disperse suspensions, we show there is a range of capillary number where the smaller particle is entrained in the film and the larger particle remains in the fluid bath, thus filtering the particles by size.



Scan the QR code for more
information and a schedule
of upcoming speakers!

