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Supramolecular Structural Forces and Hydrodynamics of Stratifying Foam Films VIVEK SHARMA, YIRAN ZHANG, SUBINUER YILIXIATI, Chemical Engineering, University of Illinois Chicago — Liquid foams are complex fluids, mostly formed by gas bubbles dispersed within a surfactant solution. The lifetime of foams depends critically on stability and drainage of thin liquid films that separate gas bubbles. It is well-established that the monotonic decrease in film thickness observed experimentally can be qualitatively described using lubrication approximation, where pressure is contributed by capillary and DLVO forces (electrostatic plus dispersion). However, foam films containing micelles, colloidal particles or polyelectrolyte-surfactant mixtures exhibit step-wise thinning or stratification. In this study, we use experiments and theory to investigate the influence of non-DLVO forces, including supramolecular oscillatory structural forces, on drainage and stratification of thin foam films (<100 nm). We discuss how the supramolecular oscillatory structural forces provide a series of metastable states, that affect the kinetics and mechanisms of drainage and rupture.

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