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Approaching a flat boundary with a block copolymer coated emulsion drop: late stage drainage dynamics. DAMITH ROZAIRO, ANDREW CROLL, North Dakota State Univ — Understanding the dynamics of the formation and drainage of the thin fluid film that becomes trapped by a deformable droplet as it approaches another object is crucial to the advancement of many industrial and biomedical applications. Adding amphiphilic diblock copolymers, which are becoming more commonly used in drug delivery and oil recovery, only add to the complexity. Despite their increased use, little is known about how long polymer chains fill an emulsion drops interface or how the molecules influence hydrodynamic processes. We study the drainage dynamics of a thin water film trapped between mica and a diblock copolymer saturated oil droplet. Specifically, we examine several different polystyrene-b-poly(ethylene oxide) (PS-PEO) molecules self-assembled at a toluene-water interface using laser scanning confocal microscopy. Our experiments reveal that the molecular details of the polymer chains deeply influence the drainage times, indicating that they are not acting as a simple surfactant. The presence of the chains creates a much slower dynamic as fluid is forced to drain through an effective polymer brush, the brush itself determined by chain packing at the interface. We present a simple model which accounts for the basic physics of the interface.

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