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Experimental droplet dynamics and interfacial rheology characterization KENDRA ERK, NIST, JEFFREY MARTIN, Johnson & Johnson, JONATHAN SCHWALBE, Mitre, FREDERICK PHELAN JR., STEVEN HUDSON, NIST — Many properties of emulsions arise from interfacial rheology. Recently, a theory of droplet dynamics accounting for interfacial rheology, Marangoni forces and mass transport was developed. Here, we describe experimental observations of droplet dynamics in light of this theory. Using particle tracking velocimetry, we examine the dynamics of surfactant-stabilized droplets in the Poiseuille flow of a microfluidic device. Interfacial shear and dilatational properties are evaluated, and we distinguish viscous and elastic effects. We find that the shear viscosity of the interface populated by block copolymer surfactant is greater than with small molecule alcohol surfactant. Investigation of small droplets is of interest not only for their relevance to emulsion applications, but their small size has potential for improved force sensitivity and temporal resolution. Other droplet dynamic approaches will be discussed.

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