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Frictional forces associated with isothermal non-wetting[1] MARIA-ISABEL CARNASCIALI, G. PAUL NEITZEL, Georgia Institute of Technology — Numerous engineering applications have been proposed to exploit the load-carrying and 'non-contact' nature of noncoalescing and nonwetting systems. One proposed application is a "lab-on-a-chip" (LOC), in which liquid samples sliding over a film of air are delivered from point-to-point without the large driving forces required to pump liquid through a microchannel. Due to the axisymmetry of the flow fields in both the lubricating gas and droplet, a stationary, thermocapillary-nonwetting droplet has a vanishing coefficient of static friction. However, once motion is imparted, the droplet deforms, requiring a force to sustain such motion. Given the very small volumes of droplets of interest in LOC applications, very little inertia must be overcome to initiate droplet motion in this near-frictionless situation. In fact, a small amount of friction in the LOC is actually desirable to enhance maneuverability of the drops on the chip. The present work seeks to quantify the frictional force for isothermal nonwetting between a drop of silicone oil and a moving, unwetted substrate due to the presence of the lubricating gas film. Current results from laboratory experiments will be presented.

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