

Abstract Submitted
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How do ultrathin sheets attach to a fluid-fluid interface? DEEPAK KUMAR, University of Massachusetts Amherst, JOSEPH D. PAULSEN, Syracuse University, THOMAS RUSSELL, BENNY DAVIDOVITCH, University of Massachusetts Amherst, DOMINIC VELLA, University of Oxford, NARAYANAN MENON, University of Massachusetts Amherst — Thin elastic sheets when placed at the interface between immiscible fluids can lower the surface energy and hence act as surface active agents. Here we report experimental studies on the dynamics of attachment of ultrathin sheets to a fluid-fluid interface. A polymer film (thickness, $t=30$ to 500nm , and lateral size, $W \sim 1\text{cm}$) is released in one of the liquid phases and driven towards the interface by gravity. At the interface, a slow initial nucleation process is followed by a rapid adsorption to the surface. Surprisingly, the three phase contact line remains stationary in the lab frame during most of the process, with the sheet bending sharply in the vicinity of the contact line. In the late stages of attachment, the sheet bends towards the interface and the contact line is observed to be moving. We find that at early times the attachment proceeds at a constant speed and compare this speed with scaling estimates.

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