

Abstract Submitted
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Dynamics of a flowing liquid column with an immiscible reactive micellar interface ZAHRA NIROOBAKHS, Dept of Materials Science and Engineering, Pennsylvania State University, ANDREW BELMONTE, Dept of Mathematics/Materials Science and Engineering, Pennsylvania State University — We experimentally investigate the instabilities resulting from the reactive formation of a thin layer of micellar material around a flowing liquid column. The material is produced when an aqueous surfactant solution (cetylpyridinium chloride) descends through a reservoir of oleic acid, a room temperature oil which can act as a weak surfactant. A variety of instabilities are observed, including connected and disconnected droplets, a straight cylindrical pipe which undergoes buckling, and various surface wave morphologies on the column. These states appear to be determined by a competition between surface tension and the growth of the interfacial material layer, as a function of imposed flow rate and surfactant concentration. Rheology provides evidence for the structural nature of the oleic/surfactant interaction, in the context of similar observations from other experiments.

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