

Abstract Submitted
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Spontaneous emulsification dynamics of natural oils SWAMI-NATHAN KALIMUTHU, MAHESH PANCHAGNULA, Indian Institute of Technology Madras — The interface between natural oils and water is partially diffused, which gives rise to interesting spreading behaviors originating from solutal Marangoni instability. This motivates the current experimental study of the resulting spontaneous emulsification of natural oil films. A drop of natural oil is placed on a water surface and the spreading and dewetting dynamics are characterized using high speed imaging. This process involves the nucleation and growth of holes in the oil film. These holes tend to ripen through the coalescence route until the film is emulsified into drops. The spreading and dewetting process can be divided into three regimes viz., (i) spreading and hole nucleation (dewetting), (ii) growth of holes and (iii) hole ripening (due to coalescence). The process is characterized in terms of the rate of hole nucleation, the surface area fraction (which is a measure of the interfacial energy) as well as the total triple line length separating the two phases. The triple line length is observed to show a power law behavior in time during the first and third regimes with the exponents being 1.5 and 0.3. Finally, the hole nucleation kinetics are shown to follow JMAK model in certain cases while showing a deviation in other cases.

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