

Abstract Submitted  
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**Relaxation of coalescing drops with insoluble surfactants at high Capillary number: the surprising encapsulation of a tiny drop inside the mother drop** CAROLINA VANNOZZI<sup>1</sup>, University of California, Santa Barbara

— A new phenomenon is reported, discovered while extending previous studies on the relaxation of two viscous drops, previously undergoing a head-on collision in an extensional flow for low  $Re$ [1], to the case with insoluble surfactants at the interface. As the Capillary number increases above 0.1, the drops are highly deformed, to the point that each drop forms two lobes separated by a thinning neck. Surfactants are convected outside the neck area and, given enough time, the drops will break up into four smaller drops. However, for certain neck thicknesses and surfactant concentrations and diffusivities, if the flow is stopped, the drops will relax back towards a spherical shape, but the Marangoni stresses, generated by the initial surfactant distribution, will also create a flow that will push the matrix fluid towards the inside of the drops. Eventually two facing spherical drops will be formed, each having inside another surfactant rich tiny drop, resulted from a break up mechanism resembling tip streaming or tip dripping [2]. [1]Vannozzi, C. Relaxation and coalescence of two equal sized viscous drops in a quiescent matrix *J. Fluid Mech.* 2012.[2]Eggleton C.D., Tsai T.-M., Stebe K.J., Tip streaming from a drop in the presence of surfactants , *Phys. Rev. Lett.* 2001.

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