

Abstract Submitted
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Formation of Satellite and subsatellite droplets in a flow-focusing junction for viscoelastic fluids DENIS FUNFSCHILLING, Laboratoire Réactions et Génie des Procédés (CNRS UPR 3349), ODILE CARRIER, HUAI-ZHI LI — The formation of a cascade of satellite and subsatellite oil droplets is observed in a flow-focusing microfluidic junction (250 micrometer of characteristic length) in the presence of surfactant (Sodium Dodecyl Sulfate), and polymer (100 to 1000 ppm of PAAm of high molecular mass). The size and distribution of the satellite and subsatellite droplets is quite reproducible. One and only one satellite droplet is formed in the dripping regime in case of Newtonian fluids [1]. When PAAm is added to the solution, the viscosity becomes viscoelastic and satellite droplets are many. The mechanism of breakup leading to multiple satellite droplets is self-repeating, as observed in previous work [2, 3]. At low frequency, the number of satellite droplet can go up to 7 or more. The distribution is generally very structured: a unique mother satellite droplet is surrounded by two daughter droplets, each of these daughter droplet is surrounded again by two grand-daughter droplets so that there are 4 daughter droplets in total. The ratio in volume between each generation is about 30. [1] Funfschilling D., Debas H., Li H.-Z. and Mason T. G., 2009, Phys. Rev. E, 80, 015301 [2] Muzzio F. J., Tjahjadi M. and Ottino J. M. 1991, Phys. Rev. Lett. 67, 54-57 [3] Tjahjadi M., Stone H. A. and Ottino J. M. 1992, J. Fluid Mech. 243, 297-317

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