

Abstract Submitted  
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**Nanoemulsion Through Stretching-Folding Instability** CLAUS-DIETER OHL, CHON U. CHAN, Nanyang Technological University — A new kind of instability sets in when a oil filament is focused by surrounding water-flow through a thin constriction commonly used in fluid focusing devices. At sufficiently high flow rates the oil filament is forced into harmonic oscillations through interfacial forces. Past the constriction the liquid is suddenly slowed down which leads to rapid shortening of the filament's wavelength. At sufficiently high amplitudes the co-flowing water stream breaks up and pinches off micrometer and sub-micrometer sized droplets in a very repeatable manner, thus producing a water-in-oil emulsion. This pinch off is caused by a stretching and folding instability when the oscillating flow impinges into the quasi stagnant reservoir past the constriction. We will present high-speed movies at up to 300,000 frames per second resolving details of the very fast events. A simple model based on restoring interfacial forces is able to predict the kilohertz oscillation frequency observed.

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