Abstract Submitted for the DFD07 Meeting of The American Physical Society

Formation and breakup of capillary viscous threads in square microchannels THOMAS CUBAUD, State University of New York at Stony Brook, THOMAS G. MASON, University of California, Los Angeles — We experimentally study the formation and the breakup transition of a viscous thread in a less viscous, immiscible liquid by hydrodynamic focusing into a square microchannel. Over large range of variations in both viscosities and interfacial tension, five characteristic regimes, including threading, jetting, dripping, tubing, and displacement are located on a phase-diagram based on the capillary number of each fluid. In the jetting and the dripping regimes, droplets size is measured and related to fluid properties, flow parameters, and geometry. The critical thread length before jetting as well as the critical length of a viscous tail before breakup are also examined. This study provides a means for producing supra- and sub-channel size viscous droplets in an elementary microfluidic geometry.

> Thomas Cubaud State University of New York at Stony Brook

Date submitted: 12 Sep 2007

Electronic form version 1.4