Abstract Submitted
for the DFD05 Meeting of
The American Physical Society

Viscous folding in microfluidics THOMAS CUBAUD, THOMAS G. MASON, UCLA, Chemistry and Biochemistry Dept. — We explore folding instabilities of viscous threads co-flowing with miscible Newtonian liquids in diverging microchannels. Surface tension does not play a role in the instabilities, yet we find a remarkably wide range of flow morphologies, such as folds, heterogeneous viscous flow, and the formation of viscous droplets, dendrites, and plumes. By systematically varying the relative flow rate and the relative viscosity, we have created a detailed map of these diverse instabilities over several orders of magnitude in a dimensionless dynamical phase space. Our results highlight the advantages of the microfluidic approach and have important implications in geophysics and materials processing.

Thomas Cubaud
UCLA, Chemistry and Biochemistry Dept.

Date submitted: 04 Aug 2005 Electronic form version 1.4