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Swirling of viscous threads in microchannels THOMAS CUBAUD, THOMAS G. MASON, UCLA, Chemistry and Biochemistry Dept. — We experimentally investigate the stability of viscous threads that are swept along in the flow of a less viscous miscible liquid in a square microchannel. Thin threads near the walls become unstable to shear-induced disturbances, which ultimately cause the threads to break-up and form arrays of viscous swirls, the miscible counterparts of droplets. We investigate the deformation morphologies of the threads during the swirling instability as well as the hydrodynamic coupling between the threads, which can produce intermingling phase-locked multiple folding. Our study highlights the possibility of forming and controlling the size and the shape of discrete and well-defined viscous elements without surface tension at the microscale.

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