Highly diffusive fluid threads in microchannels[1] THOMAS CUBAUD, Stony Brook University — The behavior of viscous fluid threads concurrently flowing with fully and partially miscible solvents is experimentally investigated in square microchannels. Diffusive fluid threads significantly swell at low flow velocities due to large specific interfacial area and hydrodynamic lubrication. An approach based on bounded function analysis of confined thread diameter is employed to model diffusive behavior of viscosity-differing fluids at the small scale. This works shows the determination of a critical flow rate associated with each fluid pair and the use of dynamic similarity to calculate diffusion coefficients between oils and organic solvents.

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