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Compound droplet generation with viscoelastic interfaces MAXWELL COLLYARD, St. Olaf College, GREG RANDALL, BRENT BLUE, General Atomics — Compound droplets, or droplets-within-droplets, are traditionally key components in many applications ranging from the food and drug industries to inertial fusion targets. A microfluidic double T-junction can be used to create compound droplets, but each T-junction material typically must be carefully chosen so that the generated droplet does not spread on the walls. By introducing protein into the water shell and by heating simple off-the-shelf T-junctions to 70°C, we were able to prepare oil-in-water-in-oil (O/W/O) droplets that were prevented from spreading on the channel walls. The stability is due to a thin, strong viscoelastic gel that forms on the oil/water interfaces. This is a path forward to mass fabrication of robust compound droplets since the proteins greatly stabilize the droplets near walls. Furthermore, these interfaces are less prone to deformation and useful for creation of uniform-walled shells using high electric fields.

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