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Deformation of ovalbumin-alginate capsules in a T-Junction EDGAR HÄNER, ANNE JUEL, University of Manchester — We study experimentally the flow-induced deformation of liquid-filled ovalbumin-alginate capsules in a T-junction. In applications, capsules/cells often negotiate branched networks with junctions thus experiencing large deformations. We investigate the constant volume-flux viscous flow of buoyancy-neutral thin-walled capsules close to the centreline of rectangular channels, by comparison to near-rigid gelled beads. The motion of the capsules in straight channels scales with the capillary number the ration of viscous to elastic forces. However, the effect of elastic deformation on the motion is sufficiently weak that a rigid sphere model predicts the velocity of capsules with diameters of up to 70% of that of the channel to within 5%. In the T-junction, systematic selection of daughter channel (right-left) occurs outside a finite region around the channel centreline, by contrast with near-rigid gelled beads, where the actual centreline is the separator. We quantify the behaviour of capsules in terms of their longitudinal stretching (up to a factor of three without rupture). We show the large range of deformations encountered can be applied to the measurement of the elastic properties of capsules as well as to the geometric-induced sorting and manipulation of capsules.

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