Microbubbling viscous liquids and suspensions KETAN PAN-CHOLI, Department of Materials, Queen Mary, University of London, Mile End Road, London, E1 4NS, UK, MOHAN EDIRISINGHE, Department of Mechanical Engineering, University College of London, Torrington Place, London, WC1E 7JE, UK — Using a T-junction together with a cross flow technique, we have carried out a detailed study on the formation of near-monodisperse microbubbles in liquids with viscosities in the range of 5-950 mPa s. The data collected were analysed in the context of the classical momentum equation for viscous liquid flow to propose an analytical equation correlating dimensionless viscosity ratio (μl/μg) to the ratio of liquid pressure to gas pressure (Pl/Pg) required to generate bubbles. This equation is useful in predicting Pl/Pg for microbubbling a liquid having a known viscosity. Our experimental results show that in the liquids investigated, the ratio of Pl/Pg, which is a function of dynamic equilibrium of pressure of liquid and gas at the T-junction, is decreasing proportional to dimensionless viscosity ratio. We calculated radial pressure for a given liquid pressure (Pl) to establish that for liquid viscosities ≥ 48.5 mPa s the radial velocity of liquid, which is responsible for imposing radial pressure on the gas-jet, dominates the mechanism of microbubble pinch-off. In contrast, in the low viscosity regime (≤ 48.5 mPa s), deceleration of the gas stream from the initial velocity is largely the cause of pinch-off of microbubbles. We made ceramic liquid foams using the technique.

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