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Supplementary Information

Coating particles using liquids and foams based on viscous formulations with industrial mixers: Batch operation

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S1. Contact mechanism

The dyed beads were placed centrally in the mixer amongst the non-dyed beads and snapshots of the colour distribution was taken with respective to time. It was found that excess surface liquid on the dyed beads transferred onto the non-dyed beads such that the whole bed became homogenous in colour as the mixing progressed. This is illustrated in Figure S1 of the supplementary information.

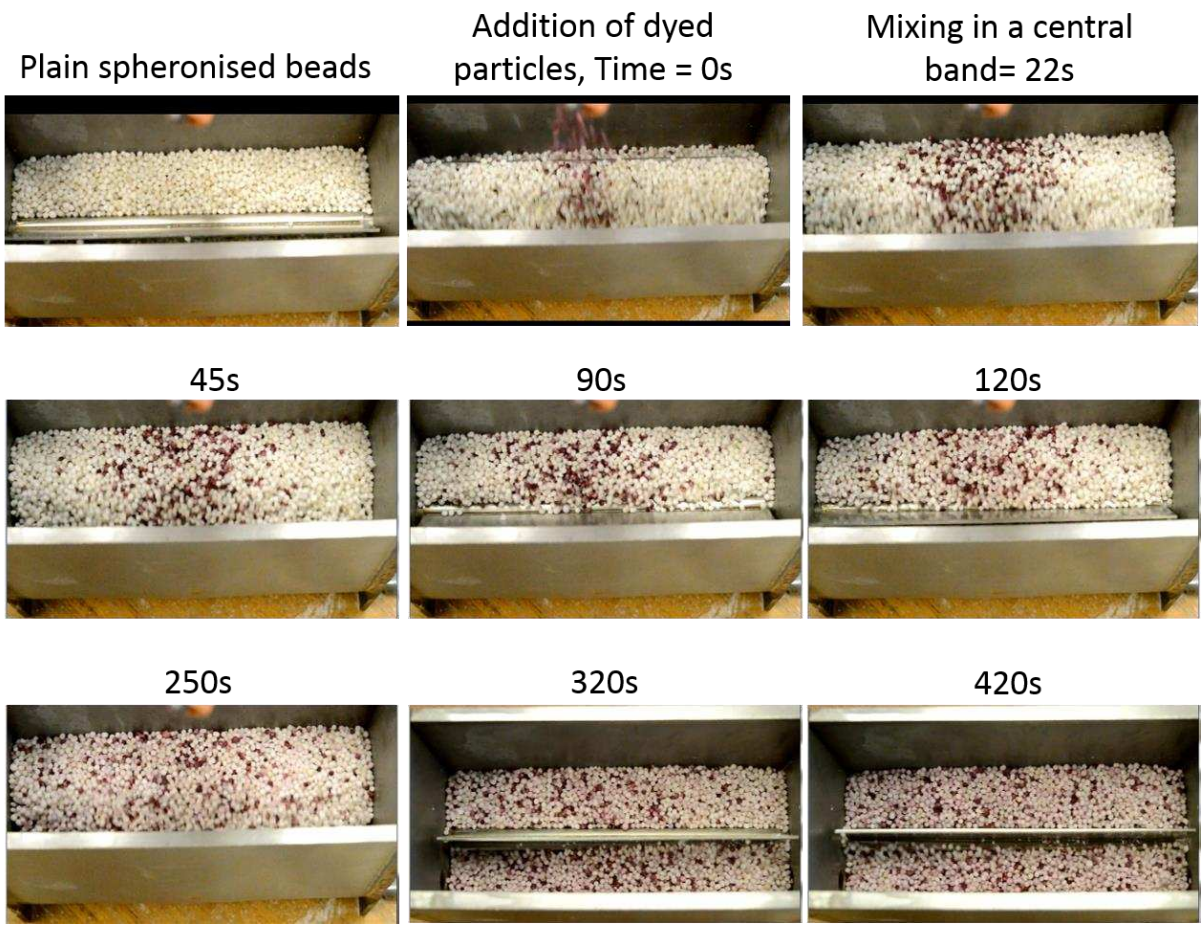

Figure S1. Illustrating the transfer of liquid from dyed beads placed centrally in the mixer onto plain beads and the distribution of colour laterally throughout the mixer with time. Suggests that this occurs via ‘contact mechanism’ as the dyed beads were dried so liquid transfer occurs from any excess dye bound to the surface of the beads after the drying process.

S2. Viscosity measurements

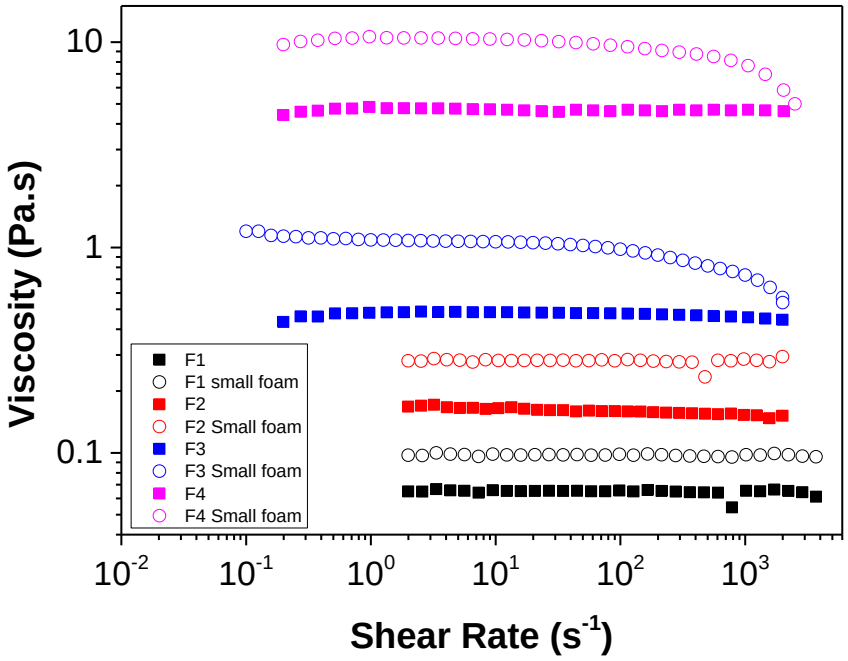

Figure S2. Effect of shear rate on apparent viscosity of small bubble foam compared to initial sugar-protein liquids (formulations 1-4). (Closed symbols represent liquid and open symbols represent the fine foam).

The data indicates that the viscosity of the liquid formulations at near zero-shear increases with increasing sugar content (F1 to F4) and all exhibit Newtonian behaviour (closed symbols). The apparent viscosity of small bubble sized foams (open symbols) prepared from these liquids using a food blender is significantly higher than the liquid. Furthermore small bubble foams of F3 and F4 exhibit shear-thinning behaviour due to the stick-slip motion of the bubbles as they rearrange and undergo structural changes with increasing shear. At around a shear rate of 2000 s^{-1} the viscosity matches that of the initial liquid as the shear causes complete breakdown of the foam structure. For small bubble foams of F1 and F2, a Newtonian behaviour is observed. This may be due to a) relatively lower gas volume fraction in the foams formed meaning a reduction in the stiffness of the foams i.e. do not shear thin or that b) much higher shear rates

are needed to obtain significant changes in the foam structure to show non-Newtonian behaviour.