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Microbubbles are micron-scale hollow spheres (normally 1–100 um) with a gaseous core coated with a thin shell. Pure saturated phospholipid coated microbubbles are widely used as an ultrasound contrast agent in biomedical applications. Besides these, bubbles play a significant role in manufacturing of many food products such as cakes, ice creams and soft drinks. The advantages of introducing microbubbles in food include lowering cost, forming novel structures and texture, modifying digestibility and tuning the intensity of flavors. Compared to traditional aerated food, the potential novel applications of microbubbles are replacement of the carbonated drinks, reduction of price per volume in products such as candy bars and enrichment of the nutrition value of the food.

In food applications, using lipid-coated microbubbles is very high cost. A food grade emulsifier is used to as alternative to generate microbubbles. The relationship of between bubble size, stability and emulsifier concentration of this multiphase and multicomponent system are studied. The experiments show that microbubble suspensions obtain good short-term stability. A fluorescence microscopy technique is used to study the microstructure of these microbubbles to further understand the low gas dissolution behavior.

Monodisperse coated microbubbles can be generated using a flow focusing technique and the size of microbubble can be controlled by adjusting the ratio of air flow rate and liquid flow rate in the flow focusing chamber. Images of the size distribution and measurements of air entrainment are used to find a relationship between emulsifier concentration and bubble size. Based on the fact that the microbubbles are very stable for a short time period, a rotational rheometer is used to measure the relationship of “real time” bubble size and rheological properties. Results for the flow behavior of the fluids with monodisperse microbubbles are shown. It is found that they have viscoelastic behavior similar to a gel. Rheological results disclose the relationship of bubble size and viscosity of fluids with microbubble suspensions.