Coarsening of aqueous foams. microgravity experiments

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ABSTRACT

Foams evolve with time due to three different processes: liquid drainage produced by gravity, bubble growth due to gas transfer (Ostwald ripening) and bubble coalescence. On Earth, only foams containing very small amounts of liquid can be studied due to rapid gravity drainage. Accordingly a project in the International Space Station (ISS) has been initiated. This project is aiming to study coarsening of wet foams and to investigate the expected change in regime at the jamming transition at a gas volume fraction of about 64%, where bubbles are spherical and in close contact. For dry foams (large gas fraction), it is known that the radius evolves as the square root of time, while for bubbly liquids (small gas fraction), it evolves as the cubic root of time. It is not yet clear from theory if the regime changes exactly at the jamming transition. The ISS experiments will start in March 2020. A description of the space experiment will be presented, in particular how the evolution of bubble size with time will be obtained. We will also present the first results for foams made with TTAB and TTAB-dodecanol solutions, with gas fractions ranging from 50 to 85%.