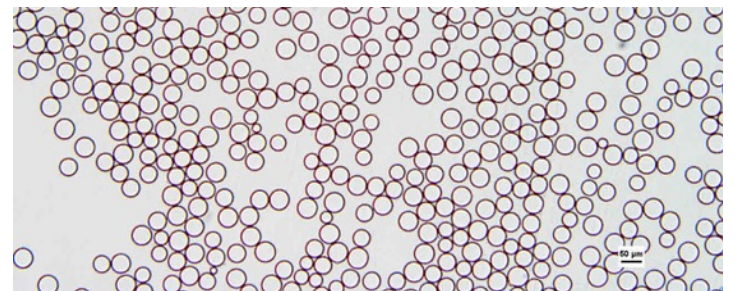
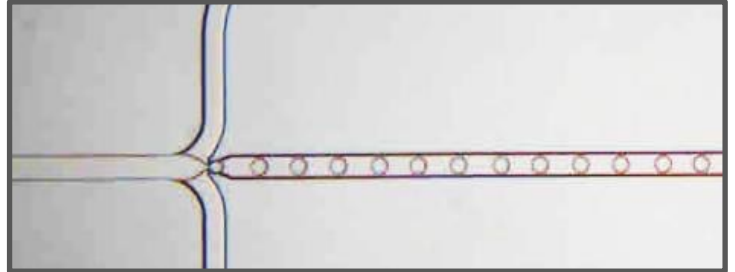
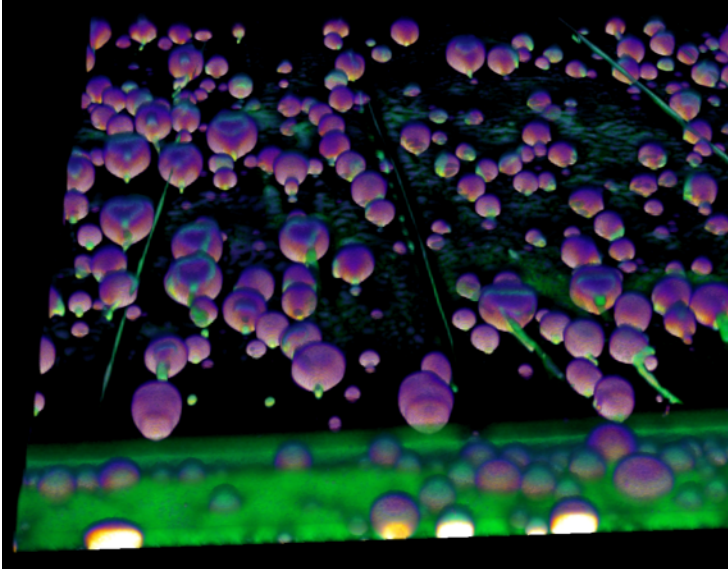


PhD position in materials science

Freezing emulsions and foams: interactions between solidification fronts and soft objects



Employer : Saint-Gobain (CIFRE fellowship)

Location : Ceramics Synthesis and Functionalization Lab, Cavaillon, France, and ESPCI lab, Paris

Date : Autumn 2016

Job description : Our group is interested in solidification phenomenon, and in particular the solidification of colloidal suspensions. During this PhD, we want to investigate the freezing behavior of deformable objects. Experimental investigations of the freezing of deformable objects such as droplets (in emulsions) or bubbles (in foams) have implications in materials science of course, and in particular in metallurgy (hydrogen bubbles in alloys) or glass science (air bubbles in molten glass), but also in food engineering, biology, geophysics (gas bubble in magma or in sea ice), etc. In situ observations of the freezing of such systems would open many exciting opportunities, since we should be able to image in situ the formation of the various phases, the segregation of the solutes, as well as the deformation of the objects and the various interfaces. The objectives of the PhD will be to develop model systems (emulsions, foams) with controlled rheology, interfacial properties and

calibrated size, understand the interactions of the objects with the front and the role of the solidification physicochemical parameters, and use this knowledge to process porous materials with controlled architectures. The candidate will be involved in upgrading the experimental setup, developing the model emulsions and foam systems, performing the experiments, analyzing the data and writing papers. Part of the PhD will take place at ESPCI in Paris, and part at LSFC in Cavaillon.

Background: materials science, soft matter, physicochemistry.

Techniques used: microfluidics, confocal microscopy, rheology, image analysis (ImageJ, Python)

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