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MSS

Sedimentation of « skinned » emulsion drops as model systems for frictional soft grains

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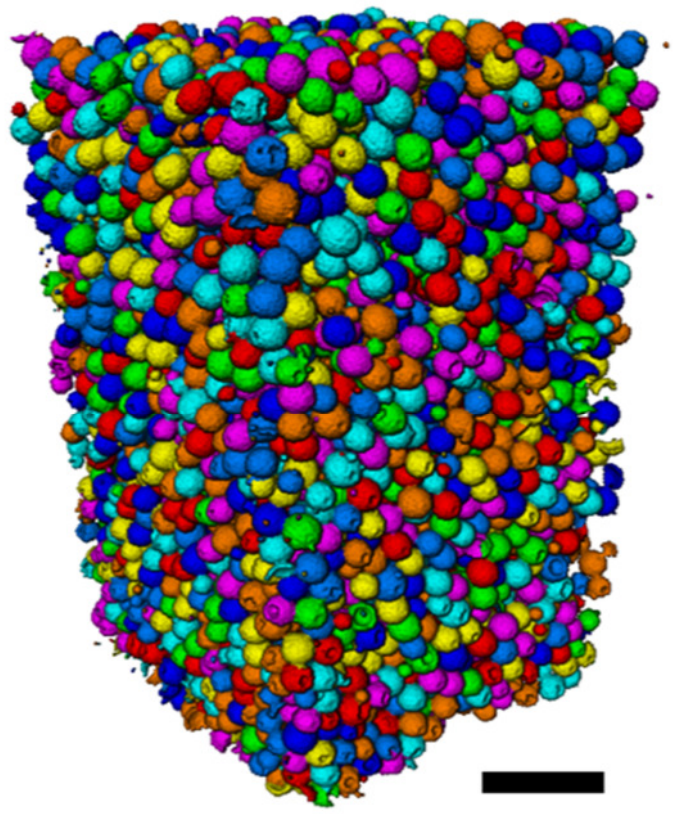

Figure 1: 3D rendering volume of a solid PEG-in-PDMS emulsion obtained by absorption contrast X-Ray tomography showing separated droplets marked by different colours after image processing. The scale bar is 4 mm.

The influence of the mechanical and frictional properties of spheres on their jamming dynamics and final packing morphology has led to numerous studies. A lot of the experimental investigations at hand deal with either hard frictional or soft frictionless grains, which are the two extremes of the spectrum of possible systems. An important question remains as to what happens for systems which are in-between these extremes, i.e. in the case of highly deformable grains presenting a frictional surface. In order to tackle this problem, we work with a model system of ultra-stable emulsions which consist of equal-volume PEG (polyethyleneglycol) drops of sub-millimetric dimensions (0.2-3 mm) which are dispersed in a continuous phase of PDMS (polydimethylsiloxane). These emulsions are stabilised by a solid-like skin around the PEG drops which creates friction between them. We characterise the final drop packing under gravity using X-Ray tomography, a non-destructive method which allows to recreate a 3D model of the samples (Figure 1). The results are compared with those known for soft systems with frictionless interfaces such as aqueous foams and surfactant-stabilised emulsions.