Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Drop floating on a granular raft ETIENNE JAMBON-PUILLET, CHRISTOPHE JOSSERAND, SUZIE PROTIERE, Institut Jean le Rond d'Alembert, Sorbonne Universites, Univ Paris 6 UPMC, CNRS UMR 7190, France
— When a droplet comes in contact with a bath of the same liquid, it coalesces to minimize the surface energy. This phenomenon reduces emulsion stability and is usually fought with surfactant molecules. Another way to slow down coalescence is to use colloidal solid particles. In this case the particles spontaneously migrate to the interface to form "Pickering" emulsions and act as a barrier between droplets. Here we use dense, large particles ($\sim 500\,\mu m$) which form a monolayer at an oil/water interface that we call a granular raft. When a droplet is placed on top of such a raft, for a given set of particle properties (contact angle/size), the raft prevents coalescence indefinitely. However, in contrast to what happens when a droplet is placed on a hydrophobic surface and never wets the surface, here the droplet is strongly anchored to the raft and deforms it. We will use this specific configuration to probe the mechanical response of the granular raft: by controlling the droplet volume we can impose tensile or compressive stresses. Finally we will show that the drop, spherical at first, slowly takes a more complex shape as it's volume increases. This shape is not reversible as the drop volume is decreased. The drop can become oblate or prolate with wrinkling of the raft.

Etienne Jambon-Puillet
Institut Jean le Rond d'Alembert, Sorbonne Universites,
Univ Paris 6 UPMC, CNRS UMR 7190, France

Date submitted: 29 Jul 2015 Electronic form version 1.4