Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Hysteresis of the Contact Angle around Spheres Adsorbed at Curved Fluid Interfaces NESRIN SENBIL, WEI HE, BENJAMIN DAVIDOVITCH, ANTHONY DINSMORE, University of Massachusetts, Amherst —
When a particle adsorbs to a fluid interface, the geometry of the contact between the interface and the particle determines the force acting on the particle. We find a significant hysteresis in the contact angle, and –surprisingly– a strong dependence of the hysteresis on the shape of the interface. Hysteresis in the wetting of a fluid on a flat substrate is well known, whereby two contact angles are typically defined, corresponding to the advancing and receding cases. We find that the receding angle around the sphere changes with the shape of the interface. We use millimeter-sized glass spheres coated with PDMS and adsorbed at an air-water interface. High-resolution images are analyzed to obtain the contact geometry as the spheres are raised or lowered across the interface. We find advancing contact angles of approximately 107^o and receding angles that range between 90^o and 97^o depending on the interface shape. Our results are important for understanding interactions between particles at interfaces and may shed new light on the origin of contact-angle hysteresis. This work is funded by the NSF through CBET-0967620 and by the Gulf of Mexico Research Initiative through the C-MEDS consortium.

Nesrin Senbil
University of Massachusetts, Amherst

Date submitted: 15 Nov 2013 Electronic form version 1.4