Key-parameters of self-assembly at fluid interfaces: contact line and contact angle

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Shape of the contact line and the contact angle of a solid particle at fluid interface, are the key to determining the colloidal assembly. A particle trapped at a fluid interface forms a contact line where the solid and the two immiscible fluids meet. At a planar interface, for instance, contact line around a spherical particle is like a circle. When the interface has anisotropic shape, however, the leading order deformation of the contact line has quadrupolar (cos(2*phi)) symmetry [1]. In our experiments, we measured shape of the contact line around millimeter-sized PDMS-coated glass spheres. Anisotropy of the interface is quantified by *deviatoric curvature*, half of the difference between the principal curvatures where center of the sphere is placed. Our measurements, to our knowledge, are the first direct observation of contact line deformation induced by anisotropic shape of the fluid interface, and they agree with the theoretical prediction [2]. We also measured the advancing and receding contact angles around spherical particles at anisotropic interfaces. Our results showed that receding contact angle of a given sphere decreased, as the *deviatoric curvature* of the fluid interface is increased [3]. Finally, I will show our current results with cylindrical particles and discuss how those results contradict with the Young-Dupre contact angle model. Our results both on contact line and contact angle are important for the use of assembly/interaction of colloids at fluid interfaces in technological aspects. This research was made possible in part by a grant from BP/The Gulf of Mexico Research Initiative through the C-MEDS consortium, and in part by the U.S. National Science Foundation (CBET-0967620).

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