

Seminar

Dynamics of Camphoric Acid Boat at the Air-Water Interface

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We experimentally study the physics of camphoric acid loaded agarose gel tablets (cboats) at the air-water interface. Camphoric acid spreads over the air-water interface due to the interfacial tension forces. When a cboat is placed at the air-water interface and let go, it is spontaneously set in motion by the interfacial tension gradients. We explain the cboat dynamics in terms of a dimensionless quantity $\xi = \frac{\Delta\sigma a}{\rho u^2 a^2}$, where $\Delta\sigma a$ is the interfacial tension force acting along a characteristic length a of cboat; $\rho u^2 a^2$ is the drag force experienced by the cboat. By definition, $\xi=1$ when the interfacial tension force and drag force are equal and the cboat moves with terminal velocity. Through control of interfacial tension, we show three distinct modes, viz. harmonic, steady, and periodic cboat motion arise for $\xi>1$, $\xi\sim 1$ and $\xi<1$ respectively.

Tuesday, May 3rd 2016

4:00 PM (Tea/Coffee at 3:45 PM)

Seminar Hall, TCIS