

Complex Liquids/Nanostructure/Macromolecules

Technion-Israel Institute of Technology

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Will talk on

Cryogenic-Temperature Electron Microscopy of Curvature-Induced Nanostructure in Ionic Surfactant Microemulsions

The nanostructure of microemulsions has been actively investigated for decades, using a variety of methods. While many microemulsion systems are known and are in commercial use today, some factors governing the nanostructure, and even types of microemulsions, are still not fully understood.

We used cryogenic-temperature electron microscopy (cryo-EM), a technique suitable for direct imaging of liquid and other high-vapor-pressure samples, to investigate the effect of the surfactant layer curvature on the nanostructure. Curvature is known to be a key factor in ionic-surfactant microemulsions for many years. Using cryo-EM, we demonstrated this some time ago on a well investigated microemulsion system, of the surfactant didodecyldimethylammonium bromide (DDAB).

In recent years, a new type of microemulsion nanostructure was discovered – high internal phase microemulsion (HIPME). This is a thermodynamically stable microemulsion, in which a solvent of very high volume ratio is dispersed as droplets in the lower-volume solvent. In earlier work, this nanostructure had been shown only for mixtures of nonionic and ionic surfactants. Using the principles of nanostructure curvature as a design tool, we formed the HIPME nanostructure using DDAB and dodecyltrimethylammonium bromide (DTAB), a purely ionic surfactant mixture.

Tuesday, 20 June 2017
14:30, Lecture Hall 6, Chemical Engineering Building