310i Reversible Change of Nanostructures in Sodium Lauryl Ether Sulfate Systems

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Nanostructures of sodium lauryl ether sulfate (SLES) in dilute and semi-concentrated water solutions are investigated by Cryo-TEM technique. Results show that with increased SLES concentration, the nanostructures of SLES in water change from spherical micelles to wormlike micelles. In the intermediate concentration, a disk-like structure is observed to coexist with the spherical and wormlike micelles. It is believed to be floppy bilayers or tiny vesicles of ~20 nm diameter.

The influence of salts on the nanostructures of dilute SLES solution was also studied. Compared to equal molar sodium chloride and magnesium chloride, calcium chloride is more effective at increasing the length of the wormlike micelles.

Moreover, a network of wormlike micelles was found in equal molar mixture of calcium chloride and 3 wt% SLES (0.08M). This network structure can be broken into spheroidal or short wormlike micelles by sonication. With aging, these small micelles grow longer, connect with each other, and eventually recover the network after 10-30 min. The breaking and reforming of the network probably correspond the shear thinning and viscosity recovering of this system.