

Structure and properties of aqueous dispersions of sodium dodecyl sulfate with carbon nanotubes

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Abstract

© 2016, Springer Science+Business Media New York. The dispersing action of the surfactant (sodium dodecyl sulfate, SDS) on the carbon nanotubes (CNT) in aqueous medium has been studied. Electron microscopy, molecular docking, NMR and IR spectroscopies were applied to determine the physical-chemical properties of CNT dispersions in SDS—water solutions. It was established that micellar adsorption of the surfactant on the surface of carbon material and solubilization of SDS in aqueous medium contribute to improving CNT dispersing in water solutions. It was shown that the non-polar hydrocarbon radicals of a single surfactant molecule form the highest possible number of contacts with the graphene surface. Upon increase of the SDS in solution these radicals form micelles connected with the surface of the nanotubes. At the sufficiently high SDS concentration the nanotube surface becomes covered with an adsorbed layer of surfactant micelles. Water molecules and sodium cations are concentrated in spaces between micelles. The observed pattern of micellar adsorption is somewhat similar to a loose bilayer of surfactant molecules.

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Keywords

carbon nanotubes, dispersions, mechanism of interaction, structure, surfactants, suspension