STRUCTURE AND PHASE BEHAVIOR OF FULLERENE C60 ENCAPSULATED TWO COMPONENT GELS

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Abstract

Mixed amphiphilic systems have been proven to possess enhanced stability and spontaneous self-assembling ability when compared to many single surfactant systems, which make them explored further for newer systems. Organogelators based on organic ammonium/pyridinium salts have been recognized as structurally simple supramolecular synthons, which could permit the fine tuning of the non-covalent molecular aggregation mode by the incorporation of selective functional groups.1 Cationic surfactant cetylpyridinium chloride (CPC) is well known for its antiseptic and antibacterial properties, while 6-aminocaproic acid (6-ACA) is a potent antifibrinolytic agent.2 Following our recent report3 on a characteristic two component charge-transfer active gel formed from the cationic cetylpyridinium chloride (CPC) in the presence of a structure forming bola-amphiphile (6-aminocaproic acid, 6-ACA), the gelation ability was evaluated in organic solvents in the presence of water. The present work focused on investigation of the effect of encapsulation of fullerene C60 in CPC: 6-ACA gel phase. Phase evolution and effect of C60 on the microstructure of CPC: 6-ACA gel phase was unraveled upon investigating the gel microstructure, based on spectroscopic, microscopic and small-angle X-ray scattering (SAXS) data. SAXS and TEM have been used to explore the microstructure and morphology of C60 encapsulated CPC: 6-ACA gel. The mixed system is technically important in tailoring microdomain properties through simple composition variations; novel structures could be obtained by changing the system's composition, rather than through synthesis of new materials. The multicomponent surfactant systems formed thermodynamically stabler gel microstructures than single component surfactants in view of the predominant charge transfer and hydrophobic interactions along with substantial -stacking.

Keywords: Fullerene C60, Molecular gels, Self-assembly, Phase behavior

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