

Nanoobjects microscopy

Structural characterization of fullerene clusters in N-Methyl-2-pyrrolidone /toluene solvents mixtures

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The clusterization of fullerene C₆₀ and C₇₀ in different nitrogen-containing solvents is connected with specific features of this class of solvents regarding the interaction with fullerenes. Solutions of fullerene C₆₀ and C₇₀ are characterized by the evolution of their ultraviolet–visible, infrared and Raman spectra. Two main processes, namely the formation of fullerenes (C₆₀ and C₇₀) clusters and change in the solute–solvent interaction, contribute to these phenomena [1,2]. The solutions of fullerene exhibit distinct solvatochromism (change in the absorption UV-Vis spectrum with time) under slight variations either in the fullerene concentration or the solvent composition. The solvatochromism strongly depends on the order of the mixture preparation. We attribute the effect to a great difference in the polarity of the liquid components, that determines different solvent–solute interaction with respect to the formation of charge-transfer complexes. It is known the dilution of C₆₀/N-methyl-2-pyrrolidone (NMP) systems by toluene or water leads to cluster reorganisation [3]. The goal of this investigation is to study composition and structure of the fullerene C₇₀ clusters in NMP solvent after addition of two differently polarity solvents (toluene, $\epsilon = 2.37$, and water, $\epsilon = 81$), by means of small-angle neutron scattering and to clarify more deeply into the mechanism of aggregation in the system.

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