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Surfactant self-aggregation within deep eutectic solvents

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Deep eutectic solvents (DESs) have shown tremendous promise as green solvents with low toxicity and cost. We present the first clear lines of evidence for self-aggregation of an anionic surfactant (SDS) within a DES (Reline) containing a small fraction of water. Significant enhancement in the solubility of organic solvents that are otherwise not miscible in choline chloride-based DESs is achieved within reline in the presence of SDS. The remarkably improved solubility of cyclohexane within SDS-added reline is attributed to the presence of spontaneously-formed cyclohexane-in-reline microemulsions by SDS. Self-aggregation of cationic surfactants of the n-alkyltrimethylammonium family within an archetypical deep eutectic solvent comprised of a 1:2 molar mixture of choline chloride and glycerol (glyceline). Estimated thermodynamic parameters suggest this self-aggregation process to be less entropically driven than that in water. These novel water-free self-assemblies might serve as dynamic soft templates to direct the growth of size- or shape-tailored nanoparticles within water-restricted media under ambient conditions. Surface tension, electrical conductivity, dynamic light scattering (DLS), small-angle X-ray scattering (SAXS), transmission electron microscopy, density and dynamic viscosity measurements along with responses from fluorescence dipolarity and microfluidity probes pyrene and 1,3-bis-(1-pyrenyl) propane, respectively, are employed to characterize these aggregates.

Biography

Mahipal has received his B.Sc. and M.Sc. (Chemistry) degree from Maharshi Dayanand University, Rohtak, India, in 2009 and 2011 respectively. He joined Department of Chemistry, Indian Institute of Technology Delhi, in 2012 as a research scholar. His research interests include Investigation of Molecular Aggregation within Ionic Liquids and Deep Eutectic Solvents. He has 5 publications in international peer reviewed journals and 7 international conferences/symposia on his credit.

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