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Strong synergism in oppositely charged mixed surfactant systems: self assembly from surface tension, rheology and SANS studies

Micellization and microstructure of mixed micelles from mixtures of an anionic fluorocarbon surfactant sodium perfluorooctanoate (NaPFO) and conventional anionic surfactant sodium oleate (NaOl) with cationic alkyl methyl-imidazolium based non-amphiphilic and amphiphilic ionic liquids (ILs) with different alkyl chain length (C4, C6, C8 and C10) and anions viz. chloride (Cl⁻), tetrafluoroborate (BF₄), hexafluorophosphate (PF₆⁻), octylsulphate [C₈SO₄⁻] and trifluoromethane sulphonate (CF₃SO₃⁻) were examined by tensiometry, rheometry and small angle neutron scattering (SANS) measurements. Low critical micelle concentration (CMC) and large negative value of interaction parameter (β) showed synergism in all the mixed systems and it depends on molecular characteristics of ILs. Higher negative value of β for NaPFO+ILs compared to NaOl+ILs shows strong synergistic interaction in perfluoro anionic surfactant system. Thermodynamic parameters for mixed monolayers and mixed micelles were evaluated and discussed. Micellar growth, shape changes and micelle to vesicle transitions obtained from these oppositely charged mixed systems depend on the surface activity of ILs (alkyl chain and counterion). The data for size, shape and aggregation number for aggregates formed by these mixed systems evaluated from the fitted SANS data are reported and discussed.

Topic

Soft Matter

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