

Ionic Liquid and Surfactant Mixture Films at the Water-Air Interface

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The behavior of Ionic liquids (ILs) at the water surface and the possibility of forming monolayers at the water-air interface has been investigated recently [1,2]. The molecular structure of ILs with long alkyl side chains resemble those of typical ionic surfactants and thus may display amphiphilicity. In this work, we report the water-air interfacial behavior of a series of ILs and extend the study to mixtures of the ionic liquid trihexyl(tetradecyl)phosphonium dicyanamide and the surfactant dioctadecyldimethylammonium bromide (DODAB) at water-air interfaces. Initial results from molecular dynamics simulations pointed out that the charged parts of the cation and anion are always intercalated with each other at low ionic liquid concentration, forming an effective 2-D polar network of alternating ions and counterions at the water surface. This finding suggests that electrostatic interactions play an important role in the self-organization of the IL monolayers. On the other hand, results obtained at high concentration of ionic liquid indicated that the charged parts of the ions are no longer forming a planar network and that the thickness of the corresponding ionic layer at the water interface is significantly larger than that in the lower regime. These results provide a wealth of information on the nature of organization of mixed ionic liquids and surfactant systems at water-air interfaces.

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References:

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