

On the theory of bulk properties of ionic liquid crystals

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The transportation of charges and ions in liquid crystals has attracted much attention recently because these materials are expected to serve as anisotropic conductors due to their self-organized structures. For this purpose the design and control of molecular interactions and microphase-segregated structures in liquid crystals is essential. While various types of ionic liquid crystals have been prepared and investigated experimentally, theories that can explain the influence of the charge distribution on the mesophase stability on ionic liquid crystals are still lacking.

Here we use the density functional theory and a molecular field theory to provide some theoretical insight into the mechanism responsible for the formation of bulk phases in ionic liquid crystals. In particular, we study the dependence of the topology of the phase diagrams on various parameters such as shape, size, charge of the molecules and the temperature.