Microemulsions Formed by a Magnetic Room Temperature Ionic Liquid (MRTIL) – Is the Structure Tunable by a Magnetic Field?

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Magnetic room-temperature ionic liquids (MRTIL) are a specific class of RTIL where an ion confers a magnetic susceptibility to the liquid, which in turn exhibits a paramagnetic behavior. The first occurrence of this new class of liquid media was discovered in 2004 [1, 2] based on the organic cation 1-butyl-3-methylimidazolium (bmim+) and the anion tetrachloroferrate (FeCl4-). Thanks to the high spin FeCl4-, a small magnet is enough to modify the meniscus of the fluid, and stronger macroscopic effects are visible when the surface tension is reduced (e.g. in a MRTIL-water biphasic system).

In this work this MRTIL was employed as a polar solvent and together with surfactant and oil (e.g. cyclohexane or decane) magnetic microemulsions were formulated [3]. The phase behaviour of these ternary systems was characterised by means of viscosity, electric conductivity, dynamic light scattering, small-angle x-ray and neutron scattering (SAXS, SANS). The structural progression in the microemulsions is similar as in classical microemulsions and follows in a systematic fashion the composition of the respective systems. Such colloidal solutions with low interfacial tensions are expected to provide a fascinating diversity of microstructural arrangement under magnetic field.

![Image of microemulsions](image)

**Fig. 1: Is the microemulsion structure tunable by a magnetic field?**