SELF-ORGANIZING IONIC LIQUID CRYSTAL COMPLEXES ON SURFACES.

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The aim of this thesis is initially to synthesize liquid crystal ion complexes by a selective coordination process in order to obtain supermolecules with unique architectures such as loop, helicate, circular helicate and grid forms, then to study their deposition on surfaces to determine their magnetic and/or optical properties as isolated molecules or in 2D networks. Strategies for the synthesis of transition metal ion complexes of polytopic ligands giving discrete, unique architectures have been extensively studied over the last thirty years[1] but have been rarely applied to the mesomorphic state[2]. The mesomorphic state is characterised by both mobility and self-organisation at the macroscopic level giving rise to properties beyond those of the single molecule such as spontaneous self-healing and orientation in an electric/magnetic field. Despite the great interest in mesomorphism in general, there are very few examples of liquid crystals prepared by formation of transition metal complexes of appropriate ligands and this approach retains significant challenges[3]. Such species should be poly-functional materials with novel properties associated with the metal ion centres (luminescence, oxido/ reduction, colours, spin crossover, paramagnetism….) while retaining typical mesomorphic properties such as a well-defined three-dimensional topology (materials with adjustable physical properties: magnetism/optical properties of mixed valence species, for example).

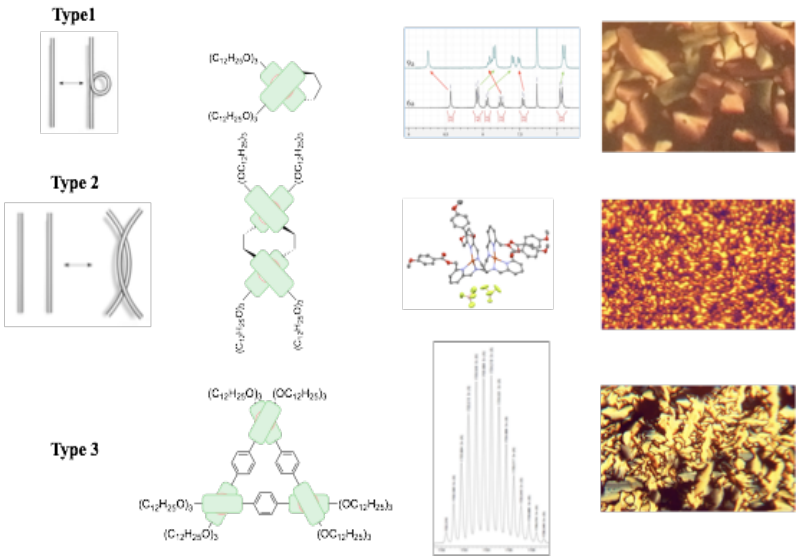

Figure 1 : Reidemeister movements induce by a selective coordination process to form ionic liquid crystal complexes.

The research activity combining the stages of synthesis and self organization on surfaces as well as characterization of the physical properties of these materials using near-field techniques. In conclusion, this project is for a chemist who wants to go beyond mere synthesis by participating in the physical studies carried out on these molecules. The work will therefore be very instructive for a young scientist in the variety of techniques that will be used.

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