IONIC LIQUID CRYSTALS WITH KNOT TOPOLOGIES

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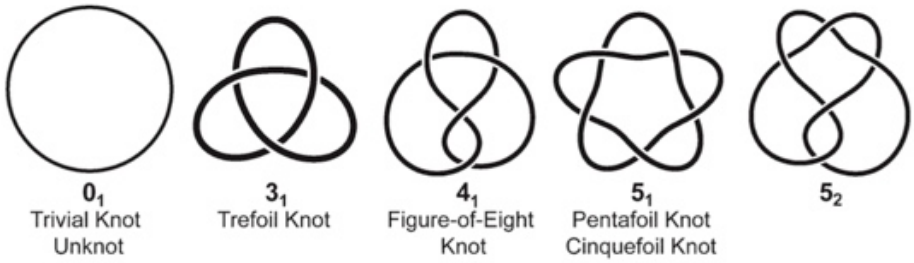
The aim of this thesis is initially to synthesize liquid crystal ion complexes by a selective coordination process to obtain supermolecules[1] with unique architectures such as helicate, circular helicate and especially knot-shaped molecules[2].



SIMPLE KNOTS AND LINKS WITH THEIR TRIVIAL NAMES AND DESCRIPTORS USING THE ALEXANDER-BRIGGS NOTATION[2].

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 but have been rarely applied to the mesomorphic state.[3,4] 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. Such species should be poly- functional materials with novel properties associated with the metal ion centres (luminescence, reduction, colours, 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). The research activity combines the synthesis steps and the characterisation of the mesomorphic properties of these materials using X-ray diffraction techniques for example. In conclusion, this project is aimed at a chemist who wishes to go beyond simple synthesis by participating in the physical studies conducted on these molecules. This work will therefore be very instructive for a young scientist because of the variety of techniques that will be used.

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