IONIC LIQUID CRYSTALS WITH HEMICYANINE CHROMOPHORES

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Compounds with a hemicyanine chromophore are well-known as dyes and they can be useful for the preparation of Langmuir-Blodgett films with non-linear optical properties [1]. We are interested in the mesomorphic properties of hemicyanine bromides with long alkyl chains:

The thermal behaviour of these compounds was investigated by differential scanning calorimetry (DSC) and by optical microscopy. The textures observed in polarised light revealed that these compounds exhibit a smectic A mesophase. A focal-conic fan texture was observed, together with regions showing homeotropic alignment. The phase behaviour of the compound with the C₁₆ chain can be summarised as: CrI • 99 • CrII • 249 • S_A • 268 • I (decomp.). The transition temperatures are rather independent of the length of the alkyl chain. The compounds have a strong tendency to supercool to a glassy mesophase. A structural model for the mesophase is proposed.

In 1995, Wang *et al.* [1] reported the mesomorphic properties of lanthanide complexes (*E*)-N-hexadecyl-4-(2-(4-(dimethylamino)phenyl)ethylene)pyridinium tetrakis(1-phenyl-3-methyl-4-benzoyl-5-pyrazolonato)lanthanide(III) (where the lanthanide(III) was La(III), Nd(III), Dy(III) and Yb(III)). Inspired by this work, we wanted to develop new lanthanide-containing metallomesogens. The basic idea was to substitute the bromide ion in the hemicyanine bromide by a negatively charged lanthanide(III) tetrakis(β-diketonate) complex:

Since the type of β-diketone and the terminal alkyl groups of the hemicyanine can be varied, this approach seemed very promising for fine-tuning the mesomorphic properties of the lanthanide complexes. This could open the door for replacement of the lanthanide tetrakis(β-diketonate) complex as the anion by other negatively charged lanthanide complexes. The thermal behaviour of lanthanide complexes with the hemicyanine chromophore is discussed.

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