

Title: **Preparation and characterization of lyotropic chromonic liquid crystals.**

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Chromonic lyotropic liquid crystals are a new type of anisotropic liquids based on water-based self-assembly of non-amphiphilic polyaromatic molecules with peripheral polar groups, such as many dyes, drugs and nucleic acids, etc. The π - π interaction between flat core areas of molecules mainly drives to the formation of the supramolecular structures.

We principally studied two chromonic liquid crystal materials: Sunset Yellow SSY (a food dye) and cromolyn sodium DSCG (a drug). All of their behaviours were both temperature and concentration dependent and exhibited three different phases: isotropic, nematic and columnar, and coexistent regions between isotropic and nematic, and nematic and columnar. All these phases have been studied in this work, taking a closer look at the SSY diagram phase.

Although lyotropic systems are notoriously difficult to align, we achieved a homogeneously and a degenerate planar anchoring for both lyotropic materials and homeotropic alignment for SSY, which is difficult to achieve. These alignments are obtained by physic-chemical treatments onto the glass surface, that are also reported in this work. All the characterization is done by polarizing microscopy.

Finally, we report different emulsion of liquid crystals to obtain basic properties of chromonic lyotropic liquid crystals such as formation dynamics, bulk elasticity, and surface anchoring which are neither fully characterized nor understood. By using Sunset Yellow and a thermotropic liquid crystal called 5CB we propose different configurations that may help to understand these systems and unveil new applications.

Keywords: Lyotropic chromonic liquid crystals, self-assembly, SSY, DSCG, liquid crystal emulsion.