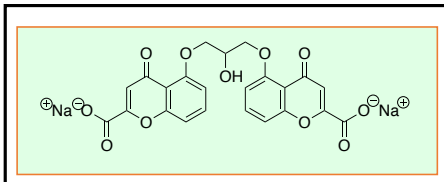
Lyotropic chromonic liquid crystalline macromolecules derived from small molecules as functional materials in opto-electronic applications.

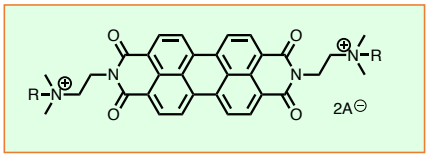
Possessing rigid, plank-shaped aromatic cores and often functionalized at the periphery with ionic groups to aid solubility in aqueous solutions, lyotropic chromonic liquid crystals are a unique subset of liquid crystals. Finding applications in biological fields including drugs to fabrication of devices such as biosensors and use as optical polarizers and compensators, these molecules are promising new breakthroughs in future devices and technologies.

The majority of research has centered on utilizing them as small molecules; but these often presents processing difficulties and a host of other unattractive defects like cracks when they are made into thin films. By transforming these small molecules into large macromolecules, there's a general expectation that some of the current problems can be circumvented.

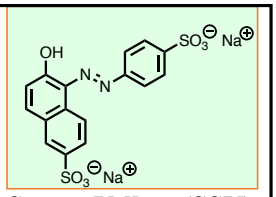
Current experiments show that we can fix the stack lengths of chromonic aromatic cores and thanks to robust ring opening metathesis polymerization friendly monomers designed with the aromatic cores exhibiting chromonic properties, very narrowly dispersed polymers have been realized. With X-ray scattering techniques and a combination of spectroscopy and microscopy techniques, the purity, and structure-property relationship is well characterized.



Disodium cromoglicate (DSCG)



Perylene Dye



Sunset Yellow (SSY)