

New Chiral Discotic Liquid Crystals: Derivative of TCQ having a chiral alkyl side chain



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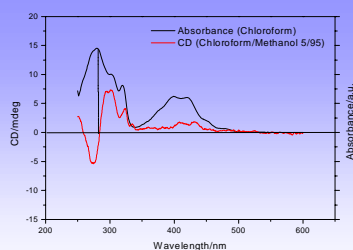
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Introduction

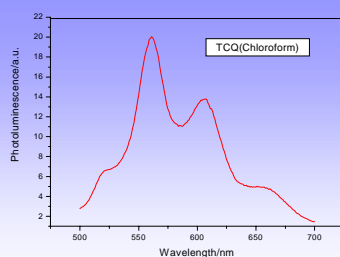
Tricycloquinazoline (TCQ-6C) has been found to function as a core fragment for a new family of discotic mesogens having C₃ symmetry and six aliphatic side chains.

Introduction of alkyl side chains to TCQ-6C was done to modify the thermal properties and to allow processing [1,2]. The substitution strategy was used to stabilize LC mesophases & bring down the clearing temperature of TCQ discotics.

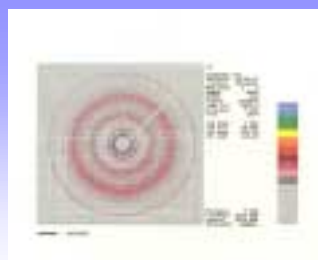
Here, we describe a synthetic route towards a branched alkyl chain substituted TCQ-6C having an asymmetric carbon which is a five step procedure. It is of physical interest especially for a potential application as electron acceptor in electronic devices.



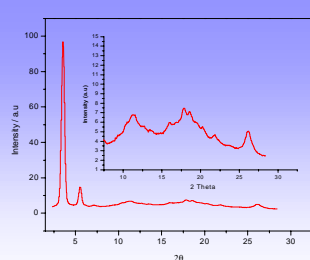
UV-Vis/CD spectrum of TCQ-6C
in solution



Fluorescence Spectra of TCQ-6C
in Chloroform



X-ray diffraction pattern of TCQ-6C
(Glassy, frozen LC phase)



References

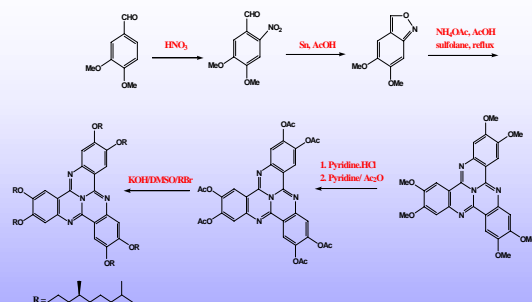
- 1) Keinan, S. Kumar, *Liquid crystals*, 1992, Vol 11, No 2, 157- 173.
- 2) S. Kumar, E. J. Wachtel, *J. Org. Chem.*, 1993, 58, 3821-3827.
- 3) P. G. Schouten, J. F. Van Der Pol, *Mol. Cryst. Liq. Cryst.*, 1991, Vol 195, 291-305

Acknowledgement

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Synthesis



Synthesis of TCQ-6C having a
asymmetric alkyl side chain.

Optical texture of TCQ-6C



Polarizing microscopic image of the mesophase of TCQ-6C
(Glassy, frozen LC phase)

Results & discussion

TCQ-6C having a chiral alkyl side chain was synthesized successfully.

The nature of the LC mesophase was studied by DSC, polarizing microscopy and X-ray diffraction. TCQ-6C forms a columnar LC mesophase (Cr 118°C, Col_h 191°C, Iso).

CD measurements display a strong bisignated CD-signal between 250 nm and 325 nm, which indicates the chiral coupling of the chromophores in the LC mesophase. A weak monosignated CD effect was observed in the region of the long wavelength absorption (400-450 nm).

Cyclic voltammetry displayed an first oxidation wave at 0.67 V and a reduction wave at -1.55 V (CH₂Cl₂ against Ag/AgCl). The optical bandgap for comparison is observed at 2.48 eV.

Cr = Crystal; Col_h = Hexagonal Columnar Liquid Crystalline Phase; Iso = Isotropic