NEW LIQUID CRYSTALLINE MATERIALS BASED ON FLUORENONE AND BENZOTHIENO-THIOPHENE

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Liquid crystals represent a fascinating state of matter which combines order and mobility at a molecular and supermolecular level with important applications in modern technology. Their mesomorphic properties depend on the molecular shape, rigidity and polarity of the molecular fragments [1-3]. Introduction of lateral dipole moments by grafting polar groups to the rigid core gives tilted phases, for example, smectic C, which are of great practical importance for switching devices [4]. A successful and widely reported rigid building block promoting the formation of SmC phase is fluorenone which has a planar and slightly bent aromatic structure [5-7]. Another interesting rigid building block for organic liquid crystals is thiophene where the polarizability of the mesogenic group is changed due to the presence of sulphur atom which changes the polarity of the local bonds.

Here we present the design, synthesis and characterization of six novel potential mesogens carrying biphenyl-benzothieno-thiophene or fluorenone rigid cores with two or more peripheral flexible alkoxy side chains of different lengths. The purity and structural characterization of the intermediates and target compounds were carried out using 1D and 2D-NMR spectroscopy and elemental analysis, while the mesomorphic properties were investigated by differential scanning calorimetry (DSC), polarizing optical microscopy (POM) and X-ray scattering (XRD). The synthetized compounds carrying biphenyl-benzothieno-thiophene rigid core were shown to support cubic phase formation depending on the length of the flexible side chains, while fluorenone-based compounds displayed smectic phase depending on the number of side chains.

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