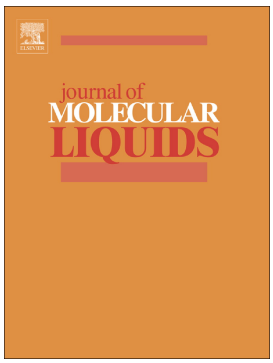

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The effect of various functional groups on mesophase behavior and optical property of blue phase liquid crystal compounds based on (-)-menthol

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Abstract

In order to explore the effect of various functional groups on the mesomorphic properties, a series of menthol-based blue phase liquid crystal compounds (**A**, **B1**, **B2**, **C1**, **C2**, **D1**, **D2**) with various core structures in the molecules were synthesized. Their chemical structures and phase behavior were characterized with FT-IR, ^{1}H NMR, differential scanning calorimeter (DSC) and polarizing optical microscopy (POM). The selective reflection and photoisomerization were investigated with ultraviolet/visible (UV/VIS) spectrometer. In our case, all BPLCs showed oily streak texture with selectively reflection and blue phase (BP), irrespective of the structure of mesogenic cores. This demonstrated that (-)-menthol had high chirality, and via succinyloxy spacer group could drive molecules to arrangement in double twist cylinders of BP. The length-to-diameter ratio, the bridge bond in the aryl rings and the conjugate action in the mesogenic core had a significant effect on T_m, T_i and temperature range of BP. BPLC **A** without conjugated structure in three-benzene mesogenic core revealed a larger temperature range of BP than other BPLCs with conjugated structure.

Keywords: (-)-menthol; chiral; blue phase liquid crystals; mesogenic core; Azo; Schiff