Prospects of the development of new approaches of the preparation of anisotropic compounds and materials

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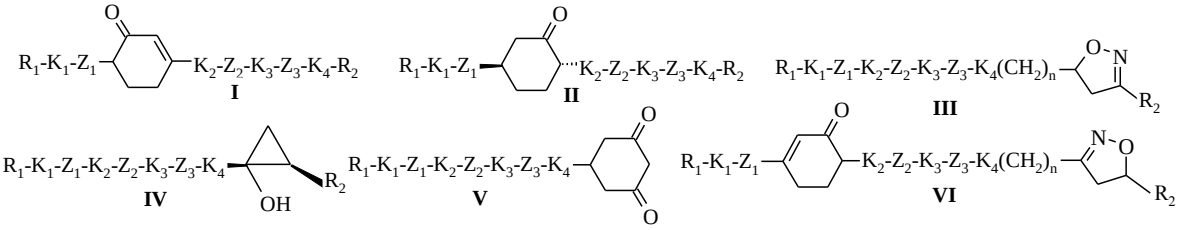
We have reported that different liquid crystalline derivatives of cyclohexane, cyclohexene, biphenyl and terphenyl can be prepared from appropriate 3,6-disubstituted cyclohex-2-enones, 3,5-disubstitiuted 2-isoxazolines [1]. In continuation of these investigations and in an attempt to obtain new liquid crystalline compounds and materials for different practical applications we have optimized the synthetic ways of the preparation of nematic, smectic and other anisotropic compounds. The key intermediates of these technologies are 3,6-disubstituted cyclohex-2-enones (**I**), *trans*-2,5-disubstituted cyclohexanones (**II**), 3,5-disubstitiuted 2-isoxazolines (**III**), 1,2-disubstitiuted cyclopropanoles (**IV**), 5-substituted cyclohexan-1,3-diones (**V**), substituted cyclohex-2-enonyl-2-isoxazolines (**VI**).



where $R_{1,2}$ = alkyl or alkoxy tails, F, Cl, CN, CF_3, OCF_3 or chiral fragment;
$K_{1,2,3,4}$ = benzene or cyclohexane rings; $Z_{1,2,3,4}$ = single bond or CH_2CH_2,bridge fragments; n = 0 – 5.

In this report, we summarize and show how the nematic compounds with positive or negative dielectric anisotropy, low or high birefringence; smectic C* compounds, which are characterized by a wide temperature range of the SmC* phase, a low operating voltage and a very good quality of orientation in the cells (thermal and the mechanical stable "shock-free") [2] and other advanced anisotropic compounds can be synthesized by the transformations of the corresponding starting materials (**I – VI**).

The results demonstrate that the new combinations of alkyl and substituted alkenyl tails, cyclic and bridge fragments, functional groups and the introduction of the lateral substituents in the central core of the anisotropic compounds can provide desirable variations in their properties.

The mesomorphic properties of the prepared compounds and the physical and electrooptical properties of LC compositions based upon them are discussed here, emphasizing structure-property relations.

References

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