Biaxial Nematogens – Synthesis and Structure-Property Relationship

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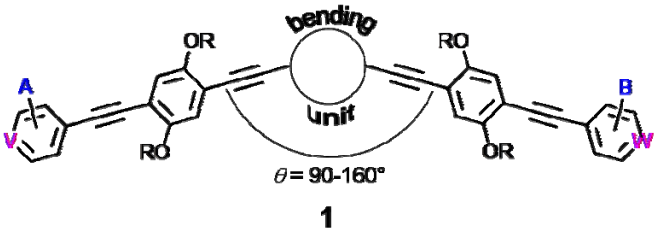

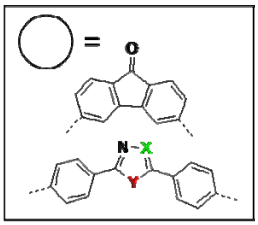

A, B = H, CN; V, W = CH, N, $C(O(CH_2)_nCOOC_2H_5$; X = N, CH; Y = O,S

R = linear and branched alkyl chains

Thermotropic biaxial nematic phases of low molar mass mesogens are recently in the focus of LC research owing to the discovery of the first example of this elusive phase in the series of bend-shaped oxadiazole derivatives.[1] Biaxial nematics are appealing from a theoretical point of view and are highly attractive with respect to the application in LC display technology.[2] Our design concept for mesogens forming a biaxial nematic phase consist of shape-persistent V-shaped molecules with a phenylene ethynylene scaffold, different heterocycles as bending units and lateral as well as terminal flexible chains. In the series of fluorenone, oxadiazole and thiadiazole derivatives monotropic biaxial nematic phases have been reported,[3] confirmed by preliminary ^{2}H Solid State NMR results, although the bending angle is far from the predicted ideal angle of 109.47°. A recent theoretical study indicates that the various dipole moments in the molecular structure may play a crucial role for the formation of biaxial phases in a large range of bending angles.[4]

Here, we present the synthesis of new shape-persistent V-shaped nematogens **1** forming enantiotropic nematic phases in temperature intervals approaching room temperature. The nature of the nematic mesophases are studied by polarised optical microscopy, differential scanning calorimetry and X-Ray diffraction.

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[2] G. R. Luckhurst, *Thin Solid Films* **2001**, *393*, 40.

[3] (a) M. Lehmann, S.-W. Kang, C. Köhn, S. Haseloh, U. Kolb, D. Schollmeyer, S. Kumar, *J. Mater. Chem.* **2006**, *16*, 4326. (b) M. Lehmann, Ch. Köhn, H. Kresse, Z. Vakhovskaya, *Chem. Commun.* **2008**, 1768. (c) M. Lehmann, J. Seltmann, A. Auer, E. Prochnow, U. Benedikt, *J. Mater. Chem.* **2009**, accepted.

[4] M. A. Bates, *Chem. Phys. Lett.* **2007**, *437*, 189.