Star-Shaped Mesogens with a Hexasubstituted C₃-Symmetric Benzene Centre

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Liquid crystalline hexa-substituted, shape-persistent benzenes are sterically crowded star molecules for which in the majority of structures, the benzene centre is symmetrically linked with six identical arms.¹ Such mesogens form predominantly nematic phases, when the arms are connected via triple bonds to reduce the steric interaction. The synthesis of liquid crystalline C₃-symmetric benzenes with six arms is more challenging, but amplifies the possibility to control nanosegregation and functionality. In the few known examples three arms were connected by non-steric demanding triple bonds, and a second set of substituents consisting of aliphatic chains was attached via oxygen or amide functions which controlled the stacking behavior in columns.

In this contribution the preparation of new shape-persistent stars 1-4 is presented. They consist of three oligo(phenylenevinylene) arms and phenyl or pyridyl groups attached to a benzene core. Such structures allow incorporating additional extended arms either by covalent bonds, such as in mesogen 3, or by hydrogen bonds (compound 4). The structure-property-relationships of the new star mesogens are studied by polarizing optical microscopy, differential scanning calorimetry, X-ray diffraction, UV-Vis- and fluorescence spectroscopy.

References:

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