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Liquid crystalline phase engineering of non-symmetric silyl-branched azobenzene polycatenars

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Non-symmetric polycatenar liquid crystals (LC) with azobenzene moieties are known to self-assemble into a wide range of different LC phases ranging from smectic structures,[1] and columnar structures[1] to chiral bicontinuous cubic[1] as well as isotropic liquid phases[1,2]. The formation of the different phases in polycatenar molecules strongly depends on the length, type, and ratio of the terminal chains.[3]

However, it is also possible to influence the LC self-assembly by modifying the alkyl chain volume by using a bulkier silyl-branched[4,5] and nano-segregating perfluorinated chains. Additionally, the LC self-assembly could be varied by introducing different spacers connecting the branched silyl chain to the rigid core.

To this end, we report herein, the design and synthesis of non-symmetric azobenzene-based polycatenars having at one side bulky silyl-branched chains and at the other end different linear and branched alkyl or perfluoro chains. Their LC self-assembly was elucidated by optical investigations, DSC and XRD. The investigated phases range from nematic and smectic phases to different mesophases with non-cubic three-dimensional structures (M1, M2).

References

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