

Mesomorphic Behaviour and dielectric response of symmetric difluoroterphenyl methylene-linked dimers

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The recent discovery of a new unusual liquid crystal phase, formed by symmetric odd-membered dimers, has attracted considerable interest towards these liquid crystal systems [1-3]. The new mesophase, termed originally Nx to indicate an unknown nematic-like mesophase and also found in the literature as twist-bend nematic (Ntb), is characterized, in common with the conventional nematic, by the absence of long range positional order and by a spontaneous spatial modulation of a phase axis [1]. Moreover the fact that Nx/tb phase is chiral in nature even though comprised by achiral molecules, poses new challenges in the research field of liquid crystals. Several complementary characterization techniques have been implemented to probe this mesophase, but its structural features and physical properties are still under debate.

In this work we investigate the mesophase behaviour and dielectric response of new symmetric difluoroterphenyl methylene-linked dimers. The phase characterization and thermal behaviour are investigated by means of Polarizing Optical Microscopy (POM) and Differential Scanning Calorimetry (DSC), while dielectric anisotropy and relaxations are investigated by means of Broadband Dielectric Spectroscopy. The results are to be discussed in connection to the molecular shape and molecular conformations, the molecular order within both nematic phases and contribute to better understanding the nematic-nematic transition in liquid crystalline dimers.

References

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