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Title:	Design, Synthesis and Characterization of Achiral Unsymmetrical Four-ring based Hockey-stick Shaped Liquid Crystals: Structure-Property relationship
Authors:	Jain, Varsha (/jspui/browse?type=author&value=Jain%2C+Varsha) Kaur, Supreet (/jspui/browse?type=author&value=Kaur%2C+Supreet) Mohiuddin, Golam (/jspui/browse?type=author&value=Mohiuddin%2C+Golam) Pal, Santanu Kumar (/jspui/browse?type=author&value=Pal%2C+Santanu+Kumar)
Keywords:	Nematic phase Mesomorphism Liquid Crystals
Issue Date:	2022
Publisher:	Taylor & Francis
Citation:	Liquid Crystals, 49(2), 162-171
Abstract:	Hockey-stick-shaped liquid crystals are interesting due to their unusual physical properties. Nematic phase observed in these materials have shown promising ferroelectric-like switching, ease of alignment in a planar and homeotropic cell, large flexoelectricity, etc. Polar moieties viz. F, Cl, NO ₂ , etc., in their molecular architecture lead to the development of permanent dipole moment which in turn affects the phase structure and physical properties. Herein, we have designed and synthesised a new series of four-ring-based hockey-stick-shaped molecules having polar Cl group at one end and variable aliphatic chains at another end of the molecular long axis. The four phenyl rings are attached via one ester and two imine linkages. All the compounds exhibited enantiotropic mesomorphism. The lower homologs (1–5 to 1–8) exclusively showed nematic phase whereas other higher homologs either exhibited nematic and/or smectic A phase. Compound 1–5 showed a stable nematic phase with the highest phase range of about 110 °C upon cooling. Detailed X-ray diffraction revealed the internal arrangement of molecules in layers. Density functional theory study confirmed the resultant dipole moment of the molecules (approximately 6 Debye) which in turn cancelled out in the bulk phase due to preferable antiparallel arrangement as a dimer.
Description:	Only IISERM authors are available in the record
URI:	https://doi.org/10.1080/02678292.2021.1949054 (https://doi.org/10.1080/02678292.2021.1949054) http://hdl.handle.net/123456789/4730 (http://hdl.handle.net/123456789/4730)
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