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Author: Yong-Wei Cheryl Lim Sie-Tiong Ha Guan-Yeow
Yeap S. Sreehari Sastry



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Synthesis and Mesomorphic Properties of New Heterocyclic Liquid Crystals with Ester-Chalcone Central Linkages

Yong-Wei Cheryl Lim^a, Sie-Tiong Ha^{a,*}, Guan-Yeow Yeap^b and S. Sreehari Sastry^c

^a*Department of Chemical Science, Faculty of Science, Universiti Tunku Abdul Rahman, Jln Universiti, Bandar Barat, 31900 Kampar, Perak, Malaysia*

^b*Liquid Crystal Research Laboratory, School of Chemical Sciences, Universiti Sains Malaysia, 11800 Minden, Penang, Malaysia*

^c*Department of Physics, Acharya Nagarjuna University, Nagarjuna Nagar-522 510, India*

Abstract

A series of new calamitic liquid crystals, 4-[3-(pyridin-4-yl)prop-2-enoyl]phenyl 4-alkyloxybenzoates comprising a pyridyl core, ester-chalcone central linkage and terminal alkyloxy chain were synthesized and characterized. This series consists of four members wherein the members differ by the length of alkyloxy chain ($C_nH_{2n+1}O-$, where $n = 10, 12, 14, 16$). The structures of the title compounds were elucidated using spectroscopic techniques, such as FT-IR, NMR (1H & ^{13}C) and EI-MS. Their mesomorphic properties were studied by using differential scanning calorimetry and optical polarizing microscopy. Decyloxy member was found non-mesogenic, whilst n-dodecyloxy to n-hexadecyloxy exhibited enantiotropic smectic A phase with fan-shaped texture. From the structure-property relationship study, it was proposed that the number of carbons in the alkyloxy chain must be at least 12 ($n \geq 12$) in order to generate the smectic phase in the analogous substituted $ArCOOArCOCH=CHC_5H_4N$ compounds.

Keywords: pyridyl; chalcone; smectic A; mesomorphic

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