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Education

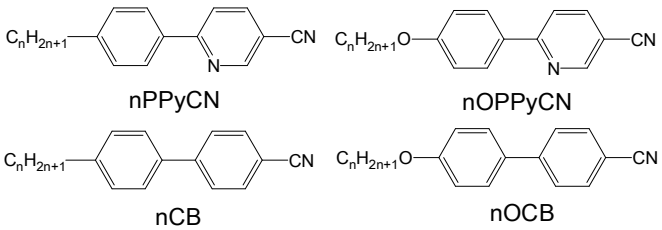
Ph.D. Department of Chemistry, University of Massachusetts, MA, USA, 1987.

B.S. Department of Chemistry, Fu Jen Catholic University, ROC, 1979.

Interests: Heterocyclic Liquid Crystal Synthesis, Heterocyclic Optoelectronic Material Synthesis, Development of New Synthetic Methodology, Polymer Synthesis, Physical Analysis of Thermotropic Liquid Crystals. My research is primarily concerned with the synthesis of advanced liquid-crystalline materials for all-optical applications, especially, pyridine, quinoline-containing heterocyclic liquid crystals. The work is highly interdisciplinary and involves a unique blend of new methodology development targeted toward the synthesis of advanced liquid crystals and evaluation of the physical characteristics of the resulting mesogens (polarized optical microscopy, differential scanning calorimetry and electrooptic studies). A number of current projects are described in the following:

Construction of pyridine unit for novel liquid crystals. A prominent area of our research involves a facile, two-step synthesis of pyridine-containg liquid crystals.(1) Although pyridine is a simple heterocyclic aryl compound, synthetic methodologies leading to the construction of this unit are rare and low yielding. We are currently using this chemistry in the synthesis of liquid crystalline molecules with cyanopyridine terminus for potentially use in the latest portable, low-power display devices.(2) Recently, We have obtained two full patents detailing the synthesis of two series of liquid crystals that have structures similar to the commercially used nCB and nOCB.(3, 4)

US Patents



High birefringence quinoline-containing liquid crystalline materials. We are concerned with the synthesis of quinoline-containing materials having birefringence of over 0.5 and are particularly interested in mesogenic materials that contain highly polarizable elements. The unique structure of the quinoline ring forms a kink in the linear calamitic structure and results in liquid crystals with characteristics of low viscosity, high polarity, and large negative dielectric anisotropy.(5, 6)

Synthesis and evaluation of novel organic electroluminescence materials. Currently we are also seeking for collaboration with other research groups on the synthesis and evaluation of novel heterocyclic materials that are capable of conferring an electroluminescence power when incorporating with a transition metal.

Selected publication

1. Chia WL, Shen SW, Lin HC. Novel synthesis of liquid crystalline compounds of 5-substituted 2-(4-alkylphenyl)pyridines. Tetrahedron Lett 2001;42:2177-2179.
2. Chia WL, Cheng YW. Facile synthesis of a series of 2-(4-alkyloxyphenyl)-5-cyanopyridine liquid crystalline compounds. Heterocycles 2008;75:375-382.
3. Chia WL, Lu RS. Facile synthesis of a series of 2-(4'-alkylphenyl)-5-cyanopyridine liquid crystalline compounds. US PATENT 7,465,802 B2 2008.
4. Chia WL, Cheng YW. Facile synthesis of a series of liquid crystalline 2-(4'-alkoxyphenyl)-5-cyanopyridine. US PATENT 7,872,143 B2 2011.
5. Chia WL, Liao KH, Ho CI. Synthesis and mesomorphic properties on the series of 2-(4-alkylphenyl)-6-methylquinolines and 2-(4-alkoxyphenyl)-6-methylquinolines. Liquid Crystals 2009;36:557-563.
6. Chia WL, Ye FJ, Chen EC. Synthesis and mesomorphic behaviour of the series of 2-(4-alkoxyphenyl)-6-methoxyquinolines and 2-(4-alkoxybiphenyl-4'-yl)-6-methoxyquinoline. Liquid Crystals 2013;40(7):989-997.