

GCOE 国際特別講演会

日時 平成21年6月10日(水)

午前10:40 ~ 午後12:10

会場 総合工学系研究棟7階ミーティングルーム

講師 Prof. Channabasaveshwar V. Yelamaggad,

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演題 1(前半 45 分)

**"Luminescent Discotic Tris(*N*-salicylideneaniline)s:
Synthesis and Mesomorphism"**

演題 2 (後半 45 分)

"Self-Assembly of Supramolecules into Helical Fluid Columns"

講師の先生は、最近インドのシリコンバレーと呼ばれ、IT 産業で有名なインドのバンガロール市から来られます。そこには、ディスコティック液晶を発見したチャンドラゼカール教授が開設した液晶研究所が、あります。現在、ここはディスコティック液晶研究の世界の中心の一つです。先生はこの研究所に所属しておられます。今回の講演では、従来にない蛍光性のディスコティック液晶と、ヘリカル構造を持つ分子集合体の二つの話題を、講演していただきます。多数のご来聴を歓迎いたします。

(世話人) 大学院総合工学系研究科

スマート材料工学講座

教授 太田和親 (内線 5492)

Lecture-1: Luminescent Discotic Tris(*N*-salicylideneaniline)s: Synthesis and Mesomorphism

C. V. Yelamaggad and A. S. Achalkumar

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Liquid crystalline tris(*N*-salicylideneaniline)s (TSANs), which can be regarded as *pseudo*-triphenylene star-shaped discotics, comprising fluorophores such as stilbene and 1,3,4-oxadiazole, have been engineered and synthesized. Thus, through the incorporation of fluorophores, the influence on the columnar behavior and photophysical features of discotic TSANs are investigated. Our study revealed that by varying the nature (polarity) of fluorophore and peripheral alkoxy chain substitution pattern, the interactions among the TSAN cores varies, and thus their columnar behavior/ physical properties alter. Particularly, the number, length and positions of peripheral alkoxy tail strongly influence mesomorphism with almost no effect on the photophysical property. On the other hand, the nature of the fluorophore dictates the emissive characteristics of these *pseudo*-triphenylene star-shaped discotics.

Relevant references (papers published so far on this topic):

1. **C.V. Yelamaggad**, A. S. Achalkumar, D.S. Shankar Rao and S. Krishna Prasad; Self-Assembly of C_{3h} and C_s Symmetric Keto-Enamine Forms of Tris(*N*-salicylideneanilines) [TSANs] into Columnar Phases : A New Family of Discotic Liquid Crystals *J. Am. Chem. Soc.*, **2004**, *126*, 6506
2. **C. V. Yelamaggad** and A. S. Achalkumar, Tris(*N*-salicylideneanilines) [TSANs] exhibiting a room temperature columnar mesophase: synthesis and characterization. *Tetrahedron Lett.*, **2006**, *47*, 7071-7075.
3. **C. V. Yelamaggad**, A. S. Achalkumar, D. S. Shankar Rao and S. Krishna Prasad; The First Examples of Optically active Tris(*N*-Salicylideneaniline)s: Manifestation of Chirality from Molecules to Fluid Columnar Phases. *J. Mater. Chem.*, **2007**, *17*, 4521- 4529.
4. **C. V. Yelamaggad**, A. S. Achalkumar, D. S. Shankar Rao and S. Krishna Prasad; A New Class of Discotic Mesogens Derived From Tris(*N*-Salicylideneaniline)s Existing in C_{3h} and C_s Keto-Enamine Forms *J. Org. Chem.*, **2007**, *72*, 8308-8318
5. **C. V. Yelamaggad**, A. S. Achalkumar, D. S. Shankar Rao and S. Krishna Prasad; Luminescent, Liquid Crystalline Tris(*N*-Salicylideneanilines)s: Synthesis and Characterization. *J. Org. Chem.*, **2009**, *74*, 3168-3171.

Lecture II: Self-Assembly of Supramolecules into Helical Fluid Columns

C. V. Yelamaggad[†], G Shanker[†], R. V. Raman Rao[§], D. S. Shankar Rao[†],
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We have demonstrated for the first time that, with the wide spread theme of residue patterning and stereochemical restraints of self-complimenting amino acids, a new and rich class oligopeptides exhibiting two-dimensional fluid aggregates having hierarchical ordering can be obtained. Thus, an elegant and simple way of achieving a new class of materials has been conceived for the synthesis of dipeptides in which the first and the second amino acid may be any one among the amino acids available yielding a large number of distinct dipeptides. In this study, however, as representative cases, L- and D-alanines, and, L- and D-leucines are chosen to form dipeptide sequence. Two pairs of enantiomers and their respective diastereomers derived from these amino acids are evidenced to self-organize into a helical columnar phase through H-bonding. The form chirality (handedness) and the magnitude of out-of-plane fluctuations of the lattice planes of the fluid supramolecular columnar structures are solely directed by the stereochemistry encoded in the spacer. Of special significance, the less frequently found oblique helical columnar phase formed by a pair of enantiomers derived from L- & D-alanines, unlike others, exhibit ferroelectric behavior; the measured spontaneous polarization is as high as 440 nC cm⁻². Besides, all these supramolecules form stable organogels in ethanol.

Relevant references (papers published so far on this topic):

C. V. Yelamaggad, G. Shanker, R. V. Raman Rao, D. S. Shankar Rao, S. Krishna Prasad, V. V. Suresh Babu; Supramolecular Helical Fluid Columns from Self-Assembly of Homomeric Dipeptides. *Chem., Eur. J.*, **2008**, *14*, 10462-10471.