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Title: Synthesis and Characterization of Novel Discotic Liquid Crystals for Potential Applications in Optoelectronic Devices

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Abstract: Discotic liquid crystals (DLCs) discovered in 1977 by S. Chandrasekhar & co-workers have become the smart materials of modern era. They have gained increasing interest due to their potential applications in organic semiconductor devices in terms of cost, mechanical flexibility and fabrication in a flexible substrate. Several molecular electronic applications such as organic light emitting diodes (OLEDs), organic field effect transistors (OFETs) and organic photovoltaic cells have been realized from these discotic systems. In addition, nematic phases formed by discotic LCs have been commercialized as optical compensation films in order to widen viewing angle of commonly used twisted nematic displays. In general, most of the DLCs showing columnar phase exhibit mesophase behaviour at high temperature and over a narrow temperature range which limits their widespread use in electronic devices. In this thesis, synthesis and characterization of novel room temperature DLCs have been presented for possible potential applications in OLEDs and display technologies. As a first example, the synthesis of dyads and triads based on triphenylene and multialkynylbenzene units which display columnar phases at room-temperature is presented. These systems also exhibited long-range columnar assembly with blue light emission in neat state which is very advantageous for the OLEDs. Second example addresses room-temperature discotic nematic mesophase resulting from the folding of the dimer constituted from triphenylene and pentaalkynylbenzene units. Third example focused on gold-nanoparticle decorated room-temperature discotic nematogens which showed enhanced dielectric response and increased conductivity values.

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