Conference- Prof. Sandeep KUMAR, Raman Research Institute, C.V. Raman Avenue, Bangalore – 560 080, India

Date: 21/11/2018 Calais : Amphitheatre B Time: 10h00

Title: **Self-assembling Supramolecular Structures as Advanced Materials for Opto-electronics**

Abstract of the talk:

Supramolecular systems are formed from molecular systems with the help of many types of interactions, such as π–π interactions; dipolar and quadrupolar interactions; van der Waals interactions, charge transfer; hydrogen bonding and metal coordination. Supramolecular assemblies are extremely important in biological and materials sciences. Liquid crystals are self-assembling supramolecular systems where small organic molecules self-organize in to various mesophases. The unique geometry of columnar mesophase formed by disk-shaped molecules is of great importance to study the one-dimensional charge and energy migration in supramolecular organized systems. There are a number of potential applications of these materials, such as, one-dimensional conductor, photoconductor, photovoltaic solar cells, light emitting diodes and gas sensors. As the conductivity along the columns in columnar mesophases has been reported to be several orders of magnitude greater than in perpendicular direction, the columns may be described as molecular wires.

The first observation of thermotropic mesomorphism in pure disc-like molecules was reported in 1977 at the Raman Research Institute. At the beginning of the discotic liquid crystal (DLC) research, more attention was devoted to reveal and evaluate structure-property relationships in this new class of liquid crystals. In 1994, it was demonstrated that the columnar phases of DLCs possess very high charge carrier mobility along the column axes. It was realized that the supramolecular order of the columnar phases of the DLCs have the potential to act as active functional materials in organic electronic and optoelectronic devices such as, photovoltaic solar cells, organic light emitting diodes, sensors, etc. In 1997, it was demonstrated that the negative birefringence films formed by polymerized discoticnematic liquid crystals can act as optical compensation films to enlarge the viewing angle and to increase the contrast ratio of liquid crystal display (LCD) devices. Following these developments, an unprecedented growth of interest in the field of DLCs has been observed during the past few years.

In this talk, Prof. Kumar will briefly present his work on the design, synthesis and characterization of various discotic liquid crystals and their potential applications in opto-electronic devices.