



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI
SHORT ABSTRACT OF THESIS

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SHORT ABSTRACT

Liquid crystals (LCs) are unique functional soft materials combining both order and mobility on molecular, supramolecular and macroscopic levels. Discotic LCs also have made notable progress in recent years, and they are finding a foothold in the main stream of organic electronics. Polycatenars and star-shaped molecules, in particular display a remarkable mesophase behavior and they belong nonconventional LCs.

Gelators are another class of molecules with specific structural features, which immobilize a large amount of solvents when they self-assemble. They may gelate organic or aqueous solvents. The self-assembly of such molecules to form gels is assisted by weak forces like H-bonding, π - π interactions, hydrophobic-hydrophilic or van der Waals interactions. Gelation brings about drastic changes in the electronic and optical properties. The 1D self-assembly of the molecules in the form of fibers has great potential in the areas of optoelectronics, controlled drug release, energy transfer, sensing, and security. Development of new approaches for the detection methods and design of novel materials that are involved in ultra-low level detection of nitroaromatic explosives (NAEs) is a very challenging area of chemical sensors. In recent years, chemical sensors with high sensitivity for the detection of NAEs for example picric acid have attracted much attention for wide applications in public security, pollution problems for humans and ecosystems.

The thesis comprises of five chapters, where the **Chapter 1** is an introductory one, on the subject of liquid crystals and gels. **Chapter 2** deals with the LC behavior, gelation and photophysical properties of some star-shaped and tetracatenars. **Chapter 3** deals with the star-shaped LCs based on heterocyclic regioisomers, while **Chapter 4** deals with the star-shaped LCs based on oxadiazole and thiadiazole heterocycles. **Chapter 5** deals with the study of low molecular weight organogelator that can sense nitroaromatic explosive picric acid with a high selectivity and sensitivity with fluorescence switching.