Section-A

π -conjugated systems have been extensively used in advanced applications such as sensors and in electronics . For these applications, π -functional materials are required that are able to form organised supramolecular assemblies of which the properties can be controlled as a function of the self assembly process and the chemical structure. Such a control is important for the improved performance of existing materials and to create new materials with tunable optical and electronic properties. The rational strategy often is to exploit the self assembly of small functional molecules into supramolecular polymers in solution or in the solid state.

Hydrogen bonds (H bonds) are ideal noncovalent interactions to construct supramolecular architectures since they are highly selective and directional. H bonds are formed when a donor (D) with an available acidic hydrogen atom is interacting with an acceptor (A) carrying available non bonding electron lone pair. The strength depends mainly on the solvent and number and sequence of the H bond donors and acceptors. In order to construct a significant amount of desired H bonded assemblies, high association constants are required. In many cases, however, relatively weak H-bond interactions are used so that additional supramolecular interactions are required to obtain nanosized assemblies.

As has been already mentioned, the unfavourable contact between water and the apolar part of surfactant molecules lead to their congregation into well organized entities, viz., micelles, vesicles, fibres, discs and tubes .Although micelles are usually spherical in shape, under certain conditions e.g., concentration, salinity or in the presence of hydrophobic counter ions, etc., they may undergo uniaxial growth. This subsequently results in the formation of significantly long yet highly flexible aggregates referred to as "wormlike micelles (WLM)". The research of WLM has drawn considerable interest because its rheology is very challenging due to the presence of multiple pertinent length scales and stress relaxation mechanisms. This relatively new material has many applications including that of fractured fluids in oil fields, efficient drag reducing agent in hydrodynamic engineering and home care, personal care and cosmetic products.Viscoelastic WLMs are formed in various surfactant systems , which include mixtures of cationic and anionic surfactants , non-ionic surfactants[24-26], zwitterionic surfactants and ionic surfactants in the presence of different additives. Among the different additives, the hydrotrope, sodium salicylate, is very effective in triggering WLM formation in cationic surfactants even at very low concentrations. Formation of WLM occurs via efficient charge screening of the surfactant head groups and the systems display very fascinating rheological behaviour as well. However, the use of salicylate as the promoter of WLM formation suffers from some limitations, especially in the oil fields due to its complex forming tendency with metal ions impurities. In spite of a large number of publications in the field, WLM formation by metal-inert promoters which may work under salt free condition is rather rare and intensive research in this area is warranted.

In view of the importance of an efficient WLM promoter , which might be effective for various applications at low surfactant concentrations and in the presence of metal ion impurities, organic π-conjugated molecules with H bonding functionality, viz., naphthols are highly promising. Moreover, since the dissociation of hydroxyl groups of naphthols is tunable by controlling the pH of the system, a facile route to design pH- responsive morphology-transition of WLM can be achieved via customized charge screening as a function of pH. This would find application in drug delivery processes. Intensive research for a fundamental understanding of the interaction of a range of hydroxyl aromatic compounds in general, and 1- and 2-napthols in particular, with that of cationic surfactants of different head groups are therefore considered to be important from the practical as well as from the fundamental understanding points of view. Role of these π-conjugated aromatic molecules in the dynamics of the formation of WLMs and their networks is worth investigating.

Viscoelastic wormlike micelles are relatively new materials which have found applications as fractured fluids, drag reducing agents and as model systems to study the basic features of different flow induced phase transitions. In view of the importance of an efficient WLM promoter, which might be effective at low surfactant concentrations and in the presence of metal ion impurities, organic π –conjugated molecules with H bonding functionality viz hydroxyl aromatic compounds, are highly promising . A detailed study on the physicochemical characteristics of the interaction of these organic systems with micellar aggregates of cationic surfactants under Newtonian flow regime, will be undertaken. The rheological characteristics and microstructures of WLM under non-Newtonian flow regime, and its morphological transition as functions of different parameters including shear, pH and temperature will be examined.