National Institute of Technology Rourkela

Synopsis Seminar

Seminar Title	: Fluorescent Bile Acid Derivatives: Synthesis, Photophysics, Supramolecular Assembly, and Interactions with Biological Systems Towards Applications as Bioprobes and Drug Carriers
Speaker	: Kuldeep (Rollno : 519cy1003)
Supervisor	: Usharani Subuddhi
Venue	: Seminar Room, Dept. of Chemistry
Date and Time	: 09 Jul 2025 (4 PM)
Abstract	: Bile acids (BA),known as bio-surfactants, are naturally occurring steroidal amphiphiles that facilitate the intestinal absorption of cholesterol, lipids, and dietary fats. Inspired by nature, researchers are engaged in designing new BA-based derivatives with the aim of broadening their functions and potential applications in diverse fields. The ease of functionalization of BAs has boosted their use as inexpensive building blocks for the fabrication of a broad set of value-added derivatives for diverse applications. A fluorescent bioconjugate of BAs (FBA) combines the natural properties of BAs with a suitable fluorophore to retain the biological activity of the BAs, while adding fascinating optical properties, thus leveraging the distinctive properties of both components. The unique combination of the optical properties of versatile fluorophores, such as anthracene and coumarin, with the amphiphilic nature of BAs holds great potential for the development of fluorescent bioconjugates with fascinating photophysical characteristics for monitoring various biological systems and processes. In addition, these FBAs, featuring a rigid steroid skeleton, excellent facial amphiphilicity, and their polar end groups being replaced by fluorophores, are expected to exhibit attractive supramolecular assembly in aqueous solution, opening new avenues for the development of soft functional materials for biomedical applications and drug delivery. With these motives the present thesis work focuses on (i) synthesis and characterization of anthracene and coumarin conjugated BA derivatives (ii) photophysical investigations of the FBAs in conventional organic solvent media study of their (iii) self-assembly in aqueous media (iv) interactions with biological systems to explore their potential as bioprobes and (v) evaluating the FBA assemblies as drug carriers. Hence, the present work not only enhances the fundamental understanding of this unique class of amphiphiles, but also opens new prospects in tailoring novel self-assembled systems to prepare fluorescent soft materials.