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MEMBER OF BASQUE RESEARCH & TECHNOLOGY ALLIANCE

seminar

Friday, 17th March, 11.00am

Seminar Room

Host: Prof. Luis M. Liz-Marzán

Optical Activity at the Nanoscale: From Chiral Light Absorbing to Chiral Light Emitting Nanomaterials

Jatish Kumar
Department of Chemistry, Indian Institute of Science Education and Research (IISER)
Tirupati, Tirupati 517507, India

Chirality is a unique geometric property observed in nature at different hierarchical scales ranging from subatomic particles through molecules to galaxies. The filed of research is relevant to all scientific communities including chemistry, biology, physics and pharmacology. The field of chirality has seen a rejuvenation after the observation of optical activity in different classes of nanomaterials. Moreover, these materials have found application in the field of light emitting devices, enantioselective catalysis, and biosensing. The field of optical activity has seen a revival after the observation of chirality in different class of nanomaterials. A combination of two techniques, namely circular dichroism (CD) and circularly polarised luminescence (CPL), helps unravel the underlying mechanism of ground state and excited state chirality in these materials. Optically active nanomaterials have gained vast attention due to their application in the field of light emitting devices, enantioselective catalysis, biosensing and spintronics. The talk will focus on the chiral investigations of systems at varying length scales, ranging from molecular chirality to nanoscale chirality. These include non-luminescent chiral plasmonic nanomaterials as well as luminescent chiral carbon nanodots and metal nanoclusters. Chirality induced both through intrinsic structural deformation, ligand hybridization and template assisted methods have been widely explored. Our recent efforts to understand the mechanistic details of ground and excited state chirality in these nanomaterials will also be discussed briefly.

Figure: (a) Scheme illustrating the ground state chirality in plasmonic nanomaterials and (b) excited state chirality in luminescent nanodots.

References

(i) Angew. Chem. Int. Ed. **2023**, e202300461; (ii) *Chem. Sci.* **2023**, *14*, 491–498; (iii) *Nanoscale*, **2022**, *14*, 4946–4956; (iv) *J. Mater. Chem. C* **2022**, 10, 13954−13963; (v) *Front. Chem.* **2021**, 8, 557650; (vi) *J. Phys. Chem. C* **2021**, 125, 26263−26273.