# Optical Activity at Varying Length Scales: From Molecular Chirality to Nanoscale Chirality

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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. Over the decades, circular dichroism (CD) has been extensively used to study the ground chirality in molecules and material. However, circularly polarised luminescence (CPL), a relatively new technique, has gained vast attention in recent years, not only due to its potential to unravel the mechanism of excited state optical activity, but also due to the application CPL active materials offers in the field of light emitting devices, enantioselective catalysis, biosensing and spintronics. The talk will focus on the chiral investigations of various molecular systems, both organic chromophoric systems and inorganic complexes. The realm of optical activity is being extended from molecules to nanomaterials by the controlled self-assembly of molecular systems, thereby generating intense optical responses for the supramolecular aggregates. The field of optical activity has seen a rejuvenation after the observation of chirality in different class of nanomaterials. 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.

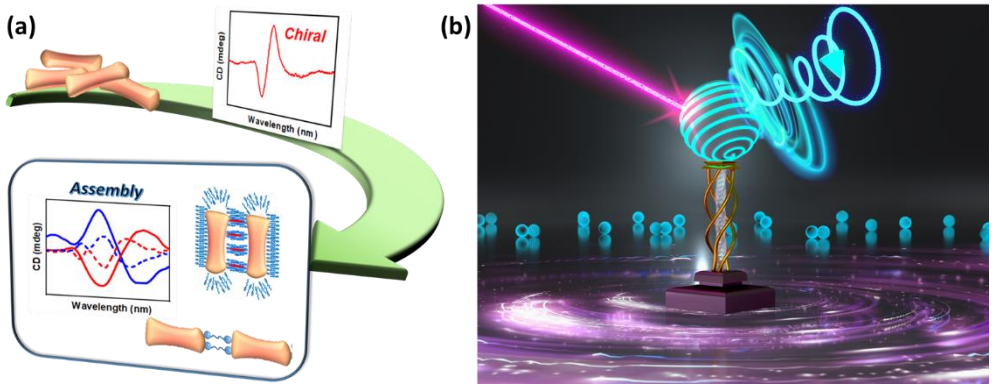


**Figure:** (a) Scheme illustrating the ground state chirality in plasmonic nanomaterials and (b) excited state chirality in luminescent nanodots.

**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.