Chiral Inorganic Nanostructures

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The early observation of strong circular dichroism for individual nanoparticles (NPs) and their assemblies have developed into a rapidly expanding field of chiral inorganic nanostructures. They encompass a large family of mirror-asymmetric constructs from metals, semiconductors, ceramics, and nanocarbons with multiple chiral geometries with characteristic scales from *Ångströms* to microns (**Figure 1**). Versatility in dimensions and polarizability of the inorganic materials enables their multiscale engineering to attain a broad range of optical and chemical properties. These capabilities as chiral materials enabled their fast technological translation for biosensing and optoelectronics, which, in turn, opened new venues for scientific inquiry into the unifying role chirality at the interface of materials science, biology, chemistry, and physics.

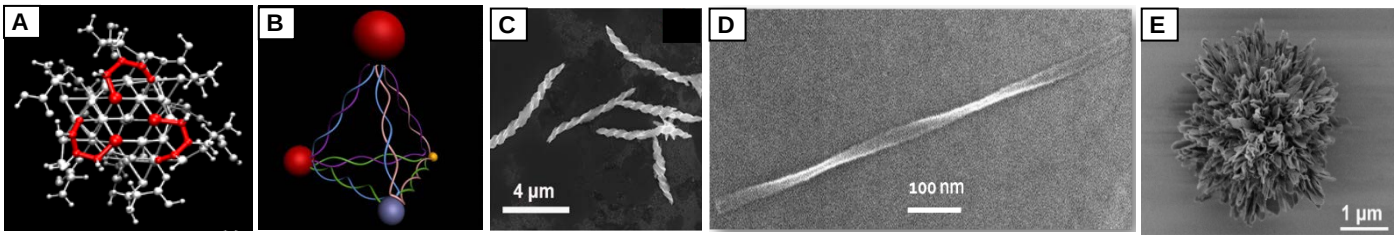

Figure 1. Typical examples of chiral inorganic materials. (A) Co_3O_4 NPs with twisted crystal lattice ; (B) tetrahedral assembly of four different NP; (C) mesoscale helices and (D) twisted ribbons self-assembled from CdTe NPs; (E) chiral hedgehog particles self-assembled from Au-S nanoplatelets.

This talk will address (**1**) the origin of the uniquely high values of optical anisotropy; (**2**) mechanisms of chirality transfer in inorganic materials; and (**3**) differences/similarities with chiral supramolecular, liquid crystal, and biological assemblies. Special attention will be given to the relationship between chirality and complexity traced over a large family of nano-, meso,- and microscale particles.

If time permits, emerging venues for practical realizations of chiral inorganic nanoassemblies related to circular polarization spectroscopy in terahertz spectral window with chiroplasmonic kirigami composites will be introduced and discussed in relation to long-standing questions intermolecular interactions of chiral supramolecules.

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