Chirality in Plasmonic Gold Nanoparticle

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From small molecules to entire organisms, evolution has refined biological structures at the nanoscale, microscale and macroscale to be chiral—that is, mirror dissymmetric. Chiral nanoscale materials can be designed that mimic, refine and advance biological chiral geometries, to engineer optical, physical and chemical properties for applications in photonics, sensing, catalysis and biomedicine. The idea that inorganic materials can be chiral seems to be counterintuitive. In this talk, I will discuss about a new mechanism that can generate chiral nanomaterials based on the interaction between chiral peptides and high index plane of metal surface. The enantioselective interaction of chiral molecules and high-Miller-index facets can break the mirror symmetry of the metal nanocrystals. I will also discuss about interesting optical properties of these chiral gold plasmonic nanoparticles that was synthesized by the peptides and amino acid. The resulting 432 symmetric chiral morphology result in the highest dissymmetry factor (g) and the efficient coupling with other materials. I believe that this synthetic approach for the chirality control of inorganic nanomaterials can have a lot of potential to maximize the light-matter interaction, resulting in many optical, electronic and biological applications.