

3D Chiral Nanomaterials with Optical Activity

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Here we present a facile route to 3D chiral plasmonic nanostructures with controllable optical activity in the visible range without using any lithographic process or chiral templates. In order to obtain out-of-plane 3D geometry, non-chiral ZnO nanopillars perpendicularly grown to the substrate were utilized as templates in the formation of plasmonic nanoshells. The chirality of the nanopillars is achieved via two-step depositions of gold layers with different thickness to break geometrical symmetry in gold nanoshells. Circular dichroism peaks were observed at the plasmonic region of gold nanoshells with opposite signs. Change of incident angle of light could increase polarization rotation strength expressed as g-factor with maximum amplitude of 0.3, which is one of the highest values reported so far. Theoretical calculations of the optical properties confirmed the experimental observations.