Double spirals created by chiral interference pattern of plasmon scattering and circularly polarized light

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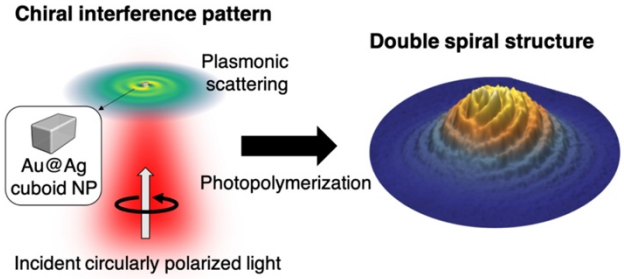
Plasmonic nanostructures provide effective methods to create chiral nano-/microstructures, based on their capability to transfer the chirality of light to matter. Recent studies have shown that a simple achiral plasmonic nanostructure can induce dissymmetry (chirality) of the electromagnetic field under the excitation with circularly polarized light.[1] However, only the strong near-field effect in the vicinity of the nanostructure has been used to create the chiral structure at the nanometer scale. Our present study focuses on the effect of the scattering field extending over the few-μm regime, which is relatively weak compared to the near-field and therefore its effect has not been well addressed in previous studies. The secondary field induced by the nanoparticles can interfere with the incident light and give rise to a novel structure of the electromagnetic field at this spatial scale. Such fields can potentially provide unique nano-/micro-structured materials via photochemical reactions. Here, we have shown that the plasmonic scattering can be coupled with the incident circularly polarized light to generate characteristic chiral interference patterns.[2] We have succeeded in exploiting this phenomenon to create the well-defined double spiral structure from achiral Au core - Ag shell (Au@Ag) cuboid nanoparticles, by applying the photopolymerization reaction under the irradiation of visible light. Our numerical calculation further supports that the experimentally obtained photopolymerized structures are consistent with the interference pattern of the electromagnetic fields. **【ref. This body consists of 224 words.】**



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