

Chirality in Low-cost Plasmonics: asymmetric nanohole arrays

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Plasmonic nanohole arrays offer applications spanning from biosensing to communications. Here we show yet another possibility enabled by low-cost fabrication and symmetry breaking: chiral effects. When the nanoholes are elliptical and tilted away from the lattice symmetry lines, they differently interact with circular polarizations of opposite handedness, i.e. they exhibit circular dichroism (CD). We apply a low-cost, simple nanosphere lithography combined with tilted silver or gold evaporation. We demonstrate intrinsic chirality and CD in various samples by measuring the extinction in the near-infrared range. We investigate dispersion relations by oblique angle excitations and in-plane tilt of the samples. We further employ numerical analysis to visualize the circular polarization coupling with the nanostructure, and find good agreement with the experiment. The coupling of these structures with chiral molecules is a subject of current work.