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Subwavelength polarization optics via helical travelling-wave nanoantennas

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A wide variety of optical applications and techniques require control of light polarization. To date, there has been no experimental demonstration of tunable polarization control with individual subwavelength devices.

We present and demonstrate the concept of a helical travelling-wave nanoantenna (HTN) consisting of a tiny gold-coated helix end-fired with a rectangular aperture nanoantenna (Fig. 1(a)). The resulting non-resonant hybrid nanoantenna produces a light beam of tunable polarization (elliptical up to circular states) by swirling surface plasmons and taking advantage of optical spin-orbit interaction (Fig. 1(b)).

Four closely packed HTNs are shown to locally convert an incoming light beam into four beams of tunable polarizations and intensities. Moreover, by coupling HTNs of opposite handedness (Fig. 1(c)), we demonstrated a subwavelength waveplate-like structure providing a degree of freedom in polarization control that is forbidden with usual polarization optics and metamaterials.

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Choix de session parallèle

5.3 SFO: Metamatériaux, plasmonique

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