Polarization-resolved characterization of plasmon waves supported by an anisotropic metasurface - DTU Orbit (22/03/2019)

Polarization-resolved characterization of plasmon waves supported by an anisotropic metasurface

Optical metasurfaces have great potential to form a platform for manipulation of surface waves. A plethora of advanced surface-wave phenomena such as negative refraction, self-collimation and channeling of 2D waves can be realized through on-demand engineering of dispersion properties of a periodic metasurface. In this letter, we report on polarization-resolved measurement of dispersion of plasmon waves supported by an anisotropic metasurface. We demonstrate that a subdiffractive array of strongly coupled resonant plasmonic nanoparticles supports both TE and TM plasmon modes at optical frequencies. With the assistance of numerical simulations we identify dipole and quadrupole dispersion bands. The shape of isofrequency contours of the modes changes drastically with frequency exhibiting nontrivial transformations of their curvature and topology that is confirmed by the experimental data. By revealing polarization degree of freedom for surface waves, our results open new routes for designing planar on-chip devices for surface photonics.

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