Dataset for Plasmonic Anapole Metamaterial for Refractive Index Sensing

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Fig. 2 Electromagnetic responses of two components of the plasmonic anapole metamaterial. (b) transmission (blue curve) and reflection (red curve) spectra, (c) multipole decomposition and phases of electric dipole and toroidal dipole moments, and (d) normalized *yz*-plane electric field and magnetic field distributions of the dumbbell-perforated gold film placed on the dielectric substrate. The field distribution is extracted from the corresponding resonant wavelength. White dashed arrows depict the orientations of the magnetic field. (e), (f), (g) and (h) Those for the vertical split-ring resonator suspended in a spin on glass layer. Feature sizes: P_x = 380 nm, P_y = 820 nm, R = 130 nm, D_x = 65 nm, D_y = 60 nm, L = 270 nm, W_x = 60 nm, W_y = 60 nm, H_1 = 30 nm, H_2 = 55 nm, and thicknesses of the perforated gold film and the spin on glass film are 30 nm and 135 nm, respectively.

Fig. 3 Electromagnetic responses of the plasmonic anapole metamaterial. (a) Measured and (b) simulated transmission (blue curve) and reflection (red curve) spectra, (c) multipole decomposition, (d) phases of electric dipole and toroidal dipole moments, and (e) normalized electric field and magnetic field distributions of the plasmonic anapole metamaterial in the *yz*-plane and the *xy*-plane. Grey dotted lines in Fig. 3b-d denote the resonant wavelength of anapole mode. White dashed arrows depict the orientations of the magnetic field. The *xy* cut plane is located in the middle of the upper dumbbell-perforated gold film. All the geometric parameters are identical to those in Fig. 2.

Fig. 4 Refractive index sensing application of the plasmonic anapole metamaterial. (a) Measured and (b) simulated transmission and reflection spectra with variable ambient refractive index from 1.30 to 1.39 with a step of 0.01. Dark (light) blue and red correspond to transmission and reflection at refractive index n = 1.30 (1.39). (c) The resonant wavelengths of the anapole mode from experimental and simulation results as functions of the ambient refractive index. The black solid lines represent the linear fitting results.