Research data for

Metadevice for intensity modulation with sub-wavelength spatial resolution

Pablo Cencillo-Abad, Nikolay I. Zheludev and Eric Plum

The manuscript contains all information required to reproduce the simulation results that it contains. Here, the numerical simulation results are given by csv (comma-separated value) tables.

Figure2a.csv: Reflection, transmission and absorption spectra of the metamaterial without the backing mirror for illumination at normal incidence by a plane wave with electric field polarized parallel to the metastrips, for wavelengths from 600 nm to 2000 nm. The first column corresponds to the wavelength in nanometers; second, third and fourth columns correspond to the reflection, transmission and absorption spectra respectively.

Figure2c_I.csv, Figure2c_II.csv, Figure2c_III.csv, Figure2c_IV.csv: Resonant modes of the metamaterial without the backing mirror in terms of the z-component of the instantaneous magnetic field extracted 10 nm above one 500 x 500 nm^2 unit cell of a metastrip. The field values are normalized by the incident wave's magnetic field amplitude. The modes are extracted for wavelengths λ = 615 nm, λ = 785 nm, λ = 930 nm and λ = 1600 nm respectively. The data points are spaced by 0.5 nm along the x and y axes. The x-coordinate increases with increasing column (left to right in the corresponding figures) and the y-coordinate increases with increasing row (bottom to top in the corresponding figures).

Figure3_I.csv, Figure3_II.csv, Figure3_III.csv, Figure3_IV.csv: Metadevice absorption (column 2) as a function of the distance (column 1) between metastrips and mirror, where the distance is varied in steps of 5 nm from 200 nm to 1200 nm for wavelengths λ = 615 nm, λ = 785 nm, λ = 930 nm and λ = 1600nm, respectively.

Figure3_I_Max.csv, Figure3_II_Max.csv, Figure3_III_Max.csv, Figure3_IV_Max.csv, Figure3_I_Min.csv, Figure3_II_Min.csv, Figure3_III_Min.csv, Figure3_IV_Min.csv: Modes of excitation of the metamaterial with the backing mirror for absorption maxima (Max) and minima (Min) in terms of the z-component of the instantaneous magnetic field extracted 10 nm above one 500 x 500 nm^2 unit cell of a metastrip. The field values are normalized by the incident wave's magnetic field amplitude. The modes are extracted for wavelengths λ = 615 nm, λ = 785 nm, λ = 930 nm and λ = 1600nm respectively. The data points are spaced by 0.5 nm along the x and y axes. The x-coordinate increases with decreasing column (left to right in the corresponding figures) and the y-coordinate increases with increasing row (bottom to top in the corresponding figures).

Figure4_a.csv, Figure4_b.csv: Absorption of the metamaterial for metastrip-to-mirror distances from 200 nm to 1200 nm and wavelengths from 600 nm to 2000 nm for the numerical and semi-analytical models respectively. Figure4_a.csv 10nm steps and Figure_4b.csv 5 nm steps in wavelength and distance. The wavelength increases with increasing row. The distance increases with increasing column.

Figure4_c.csv, Figure4_d.csv, Figure4_e.csv: Dependence of absorption on the metastrip scattering coefficient r for metastrip-to-mirror distances d = λ/4, d = λ/2 and d = λ/8 respectively. Real part of r increasing from -1 to 0 with increasing column. Imaginary part of r increasing from -0.5 to +0.5 with increasing row.

Figure5_a.csv: Total electric field amplitude normalized to the incident electric field amplitude as a function of x and z. x-axis from -3 μm to 0 μm in 6 nm steps and z-axis from -0.5 μm to 4.5 μm in 10 nm steps. The x-coordinate increases with increasing column. The z-coordinate increases with increasing row.

Figure5_b.csv: Square of the reflected electric field's amplitude normalized to the incident wave as a function of x and z. x-axis from 0 to 3 μm in 6 nm steps and z-axis from 1 μm to 4.5 μm in 10 nm steps. The x-coordinate increases with decreasing column. The z-coordinate increases with increasing row.