

Nano- and Micro-Auxetic Plasmonic Materials

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The manuscript contains a detailed description of the micro- and nanostructures and here we provide research data and additional information.

tif-image files: Scanning microscope images are provided as tif-image files following the naming conventions indicated in brackets. The images show re-entrant honeycomb microauxetic nanomembrane metamaterials with thick (samples HC1 and HC2) and thin (samples HC3 and HC4) line widths and a rectangular cell size of $7\text{ }\mu\text{m} \times 5\text{ }\mu\text{m}$. For a given structure, the images show the same rectangular cell with (Force) and without (NoForceReference) an applied stretching force as described by the manuscript. For selected structures, there are additional images showing a rectangular cell with (ForceCompression) and without (NoForceCompressionReference) application of a compressive force.

Fig_4_5_Spectra.xlsx : This file shows transmission and reflection spectra of micro- and nanoauxetic nanomembrane metamaterials illuminated by x-polarized electromagnetic waves as indicated by the manuscript.

- **Sheet “Fig4 - Optical Simulation”** lists simulated reflection and transmission at wavelengths from 700 to 2000 nm for the nanoauxetic metamaterial with a rectangular cell size of $900\text{ nm} \times 600\text{ nm}$. Reflection and transmission of the structure was calculated by simulating one rectangular cell with periodic boundary conditions using Comsol Multiphysics. The dimensions of the simulated structure approximate those of the fabricated experimental sample. The structure’s gold-covered side is illuminated by an x-polarized electromagnetic plane wave. Reflection and transmission spectra are obtained through integration of the power outflow through planes on either side of the structure, taking the incident power flow into account and normalizing to the incident power. Gold and silicon nitride were modelled using their complex wavelength-dependent permittivity.
- **Sheet “Fig5ab - FTIR Measurements”** lists measured reflection and transmission at wavelengths from 3.0 to 11.0 μm for the auxetic metamaterials based on the narrow and wide line width re-entrant honeycomb patterns with a $7\text{ }\mu\text{m} \times 5\text{ }\mu\text{m}$ rectangular cell. These spectra have been measured using a FTIR microspectrophotometer.
- **Sheet “Fig5cd - Optical measurements”** lists measured reflection and transmission at wavelengths from 700 to 2000 nm for the auxetic metamaterials based on the wide line width re-entrant honeycomb pattern with $1.8\text{ }\mu\text{m} \times 1.2\text{ }\mu\text{m}$ and $900\text{ nm} \times 600\text{ nm}$ rectangular cells. These spectra have been measured using a CRAIC microspectrophotometer.