The data is arranged into nine folders (.zip; **bold**), each of which contains the following files (.jpg, .tif, .txt, and .csv files; *italics*). This data and the descriptions below should be read in conjunction with the manuscript.

1. **Scanning Electron Microscopy**
   *Figure1a.tif;* electron micrograph of a gold gyroid metamaterial; sample “V36”, 5 kV acceleration voltage; 2.6 mm working distance.

2. **Optical Microscopy**
   *Figure1b.jpg;* optical micrograph of gold gyroid optical metamaterial under linearly polarized light; sample “V36”, linearly polarized light, reflection, 20x magnification.

3. **Reflection Goniometer Measurements**
   - *ExperimentReflectionAngles.txt;* angles (azimuthal) in ° at which reflection goniometer measurements are taken; single column.
   - *ExperimentReflectionWavelengths.txt;* wavelengths in nm at which reflection goniometer measurements are taken; single column.
   - *ExperimentReflectionSpectraGyroid.csv;* normalized goniometer reflectance spectra; rows correspond to those wavelengths in *Wavelengths.txt*, columns to those angles in *Angles.txt*.

4. **Transmission Goniometer Measurements**
   - *ExperimentTransmissionAngles.txt;* angles (azimuthal) in ° at which reflection goniometer measurements are taken; single column.
   - *ExperimentTransmissionWavelengths.txt;* wavelengths in nm at which reflection goniometer measurements are taken; single column.
   - *ExperimentTransmissionSpectraGyroid.csv;* normalized goniometer reflectance spectra; rows correspond to those wavelengths in *Wavelengths.txt*, columns to those angles in *Angles.txt*.

5. **Simulated Reflectance Spectra**
   *Reflections_tXX_phi_sweep.txt;* simulated reflectance spectra at a termination XX (e.g. XX = 0.32, where \( \tau = 0.32 \)); wavelength in nm (first column), azimuthal angle in ° (second column; 0, 45, 90, and 135°), reflectance (third column); 26 files in total.

6. **Simulated Transmittance Spectra**
   *Transmissions_t0.XX_phi_sweep.txt;* simulated reflectance spectra at a termination XX (e.g. XX = 0.32, where \( \tau = 0.32 \)); wavelength in nm (first column), azimuthal...
9. Gyroid Surface Reflectance Spectra

- **g016-XX-pol-wl.txt**: wavelengths in μm at which the τ = 0.16 gyroid surface reflectance spectra are simulated for either an original arrangement of the surface protrusion (XX = orig) or a shifted arrangement (XX = moved2a); single column; 2 files.
- **g016-XX-pol-spec.txt**: simulated reflectance spectra for the τ = 0.16 gyroid surface for either an original arrangement of the surface protrusion (XX = orig) or a shifted arrangement (XX = moved2a); rows correspond to those wavelengths in g016-XX-pol-wl.txt; polarization azimuthal angle 0° (first column), 45° (second column), 90° (third column), and 135° (fourth column); 2 files in total.
- **g016-XX-eield-YYnm-ZZdeg.txt**: simulated electric field distribution for the τ = 0.16 gyroid surface for either an original arrangement of the surface protrusion (XX = orig) or a shifted arrangement (XX = moved2a); for 605 (YY = 605) or 665 nm (YY = 665); and 45 (ZZ = 45) or 135° (ZZ = 135) polarization azimuthal angle; 4 files in total.
- **g024-XX-pol-wl.txt**: wavelengths in μm at which the τ = 0.24 gyroid surface reflectance spectra are simulated for either an original arrangement of the surface protrusion (XX = Rot0) or a rotated arrangement (XX = Rot45); single column; 2 files.
- **g024-XX-pol-spec.txt**: simulated reflectance spectra for the τ = 0.24 gyroid surface for either an original arrangement of the surface protrusion (XX = Rot0) or a rotated arrangement (XX = Rot45); rows correspond to those wavelengths in g016-XX-pol-wl.txt; polarization azimuthal angle 0° (first column), 45° (second column), 90° (third column), and 135° (fourth column); 2 files in total.
- **g024-XX-eield-YYnm-ZZdeg.txt**: simulated electric field distribution for the τ = 0.24 gyroid surface for either an original arrangement of the surface protrusion (XX = Rot0) or a rotated arrangement (XX = Rot45); for 630 (YY = 630) or 665 nm (YY = 665); and 45 (ZZ = 45) or 135° (ZZ = 135) [Rot0] or 0 (ZZ = 0) or 90° (ZZ = 90) [Rot45] polarization azimuthal angles; 4 files in total.