CONTROLLING THE ELECTROMAGNETIC FIELD IN THE OPTICAL AND THZ BANDS WITH METASURFACES

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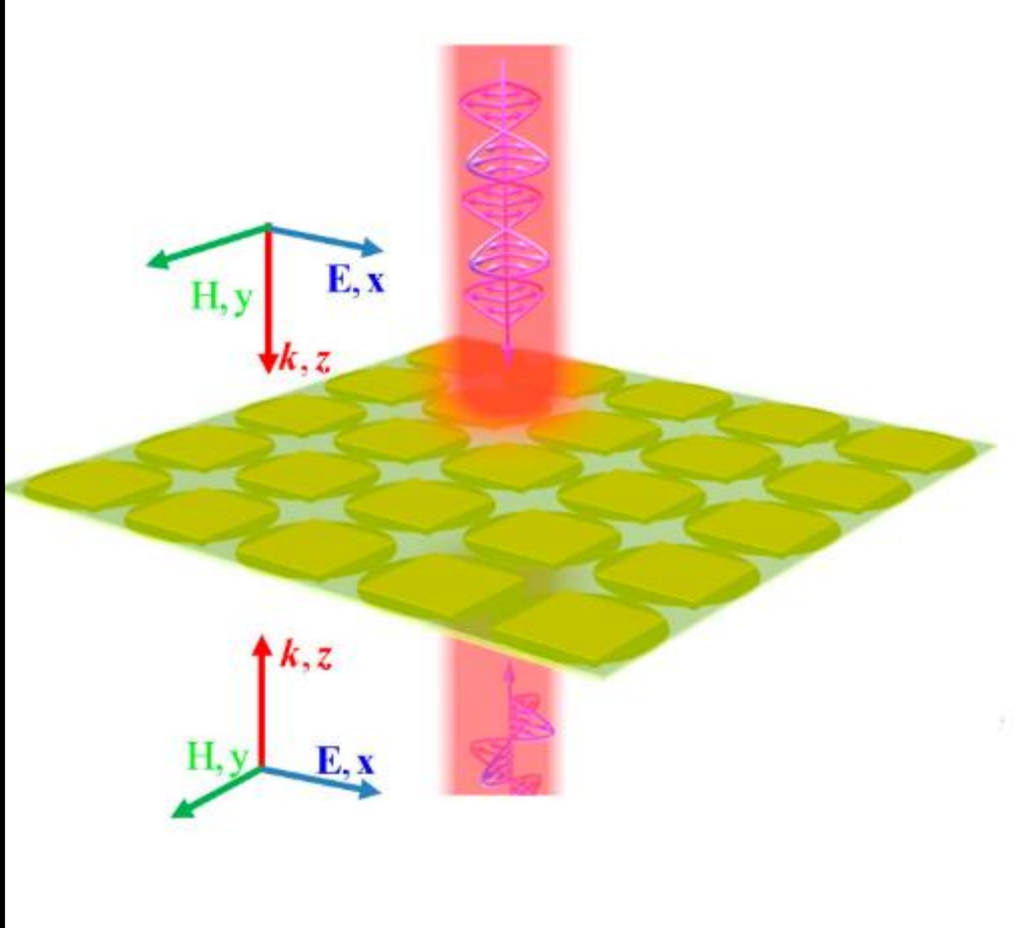
METASURFACES

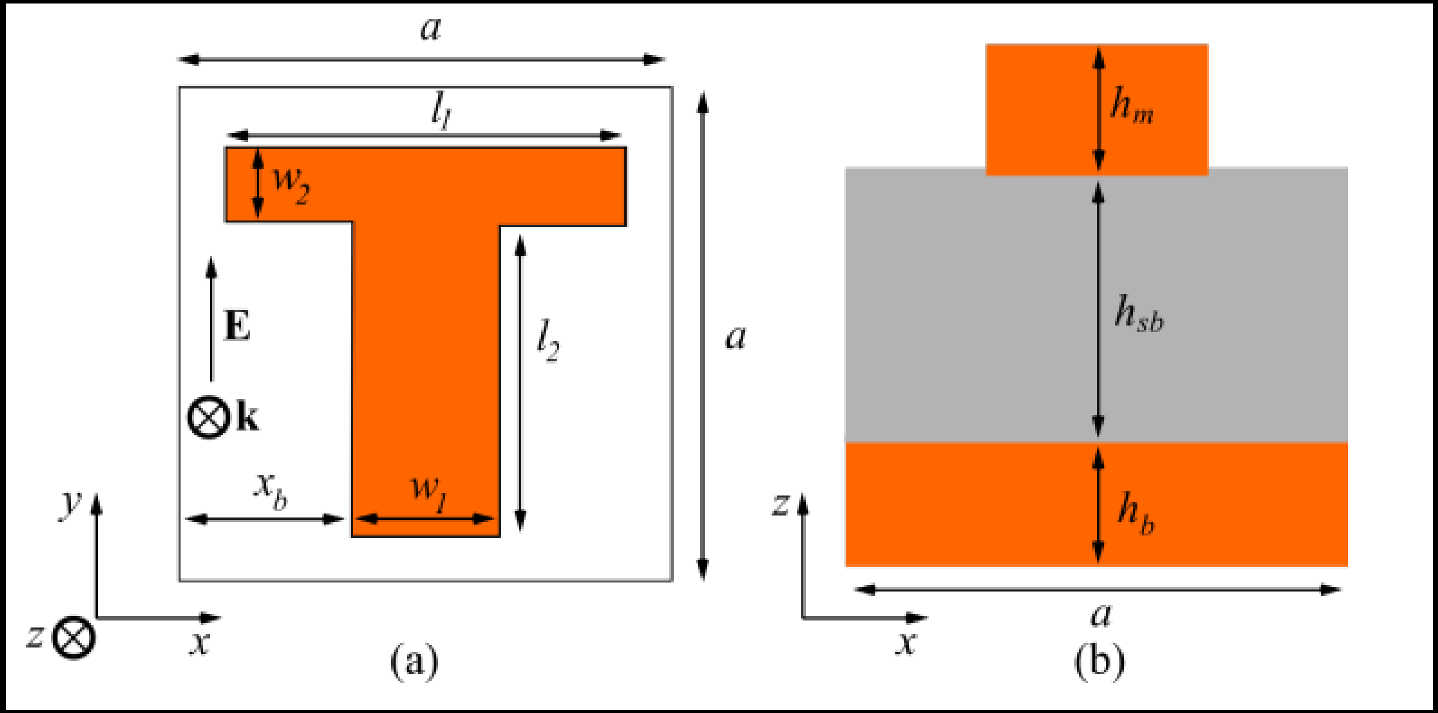
Metasurfaces are two-dimensional structures consisting of subwavelength elements that manipulate electromagnetic waves, enabling precise control over properties such as amplitude, phase, and polarization.

Some electromagnetic field properties like negative reflection and refraction, or like optical cloaking can be reached with metasurfaces.

Metasurfaces have found diverse applications in the terahertz frequency range, ranging from dichroic filters to tunable switches and absorbers.



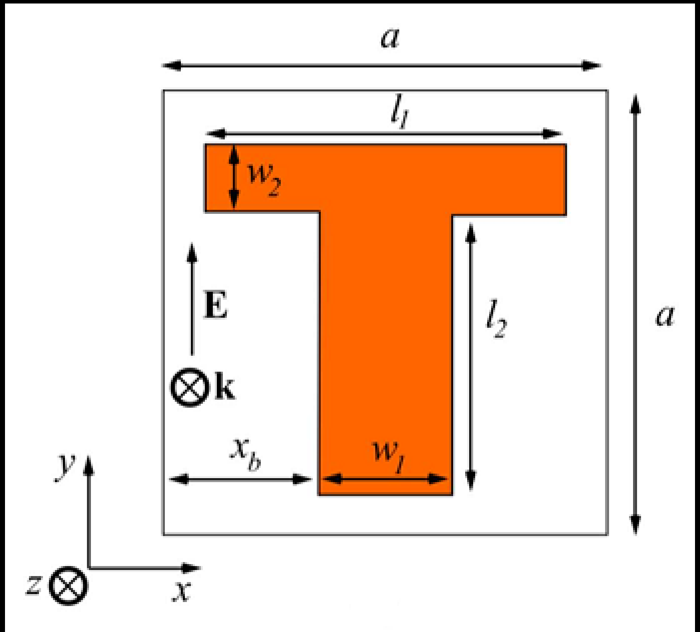
ARHITECTURE

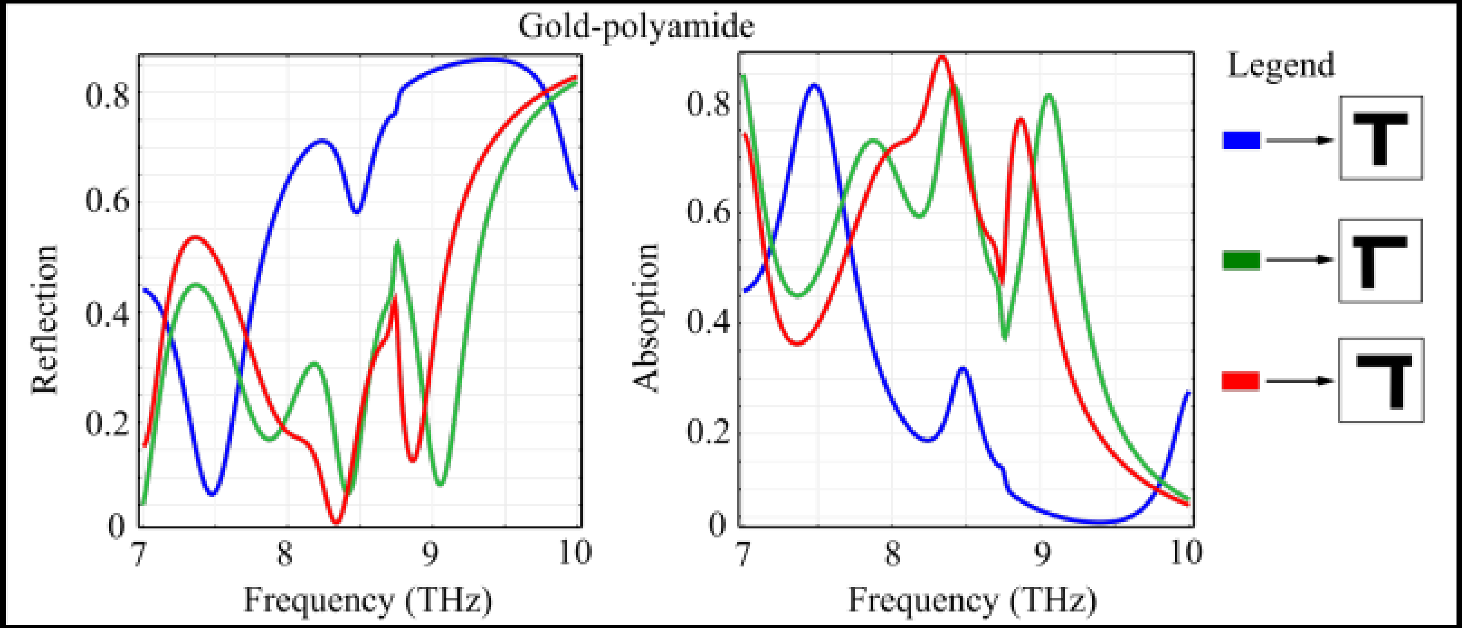


There was performed investigations on the frequency-selective response of a metal-dielectric metasurface in the 7–10 THz frequency band.

A “T”-shaped metallic nanoantenna constructed from two gold rods deposited on a polyamide substrate was chosen.

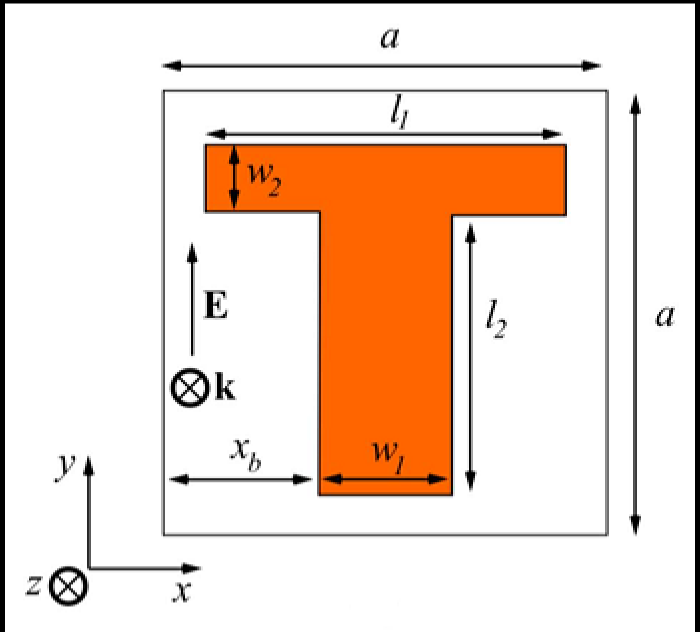
SIMULATIONS

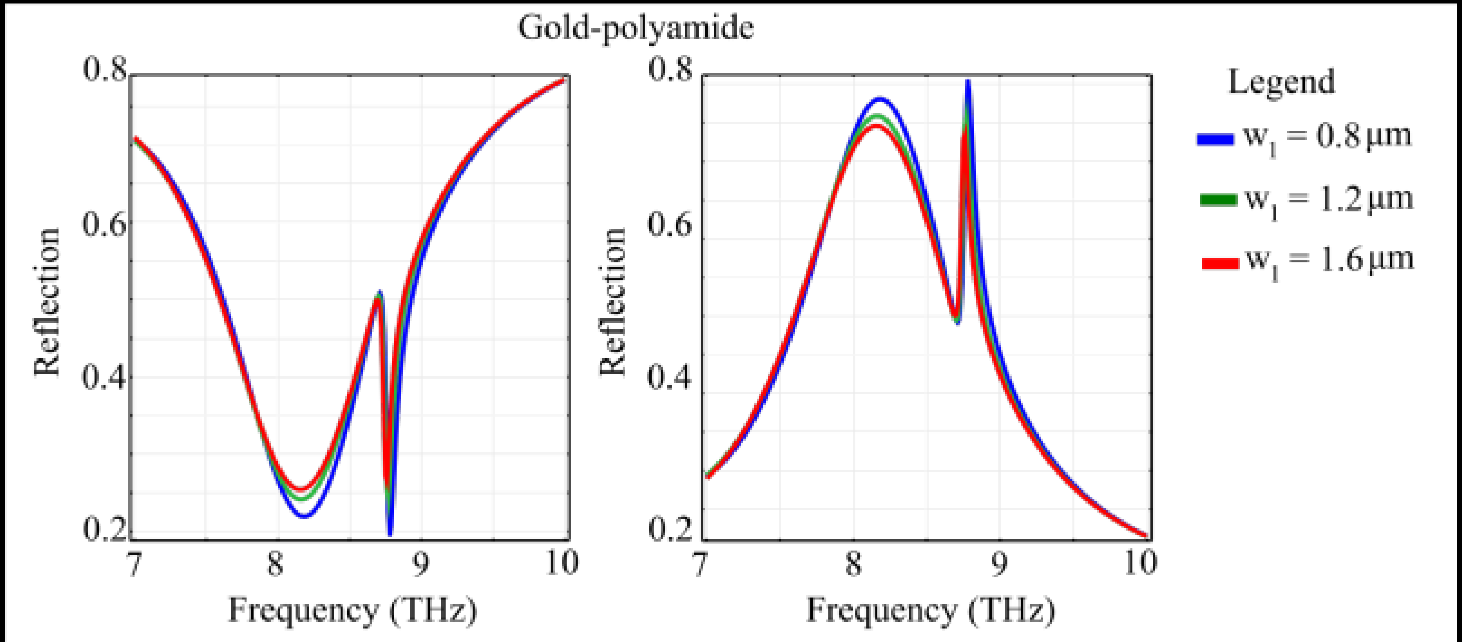




Spectral reflection and absorption of the gold-polyamide metasurface configuration, under variation of the relative coordinates of the base rod with respect to the top rod

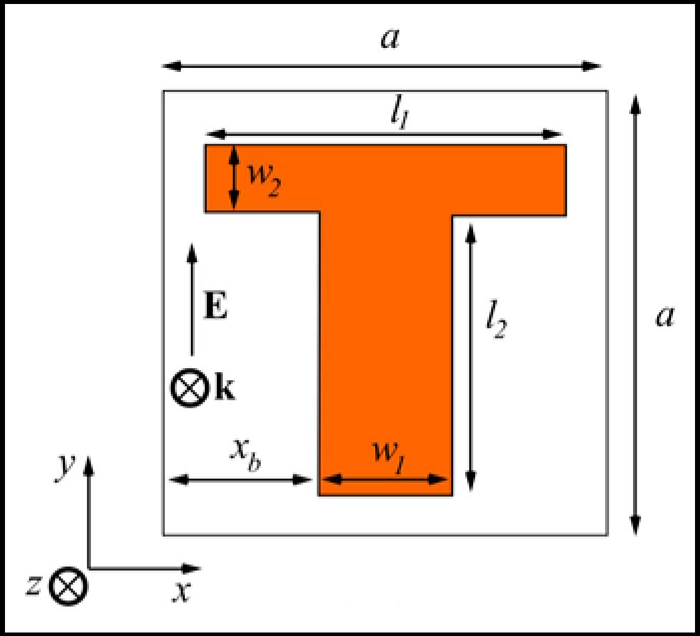
SIMULATIONS

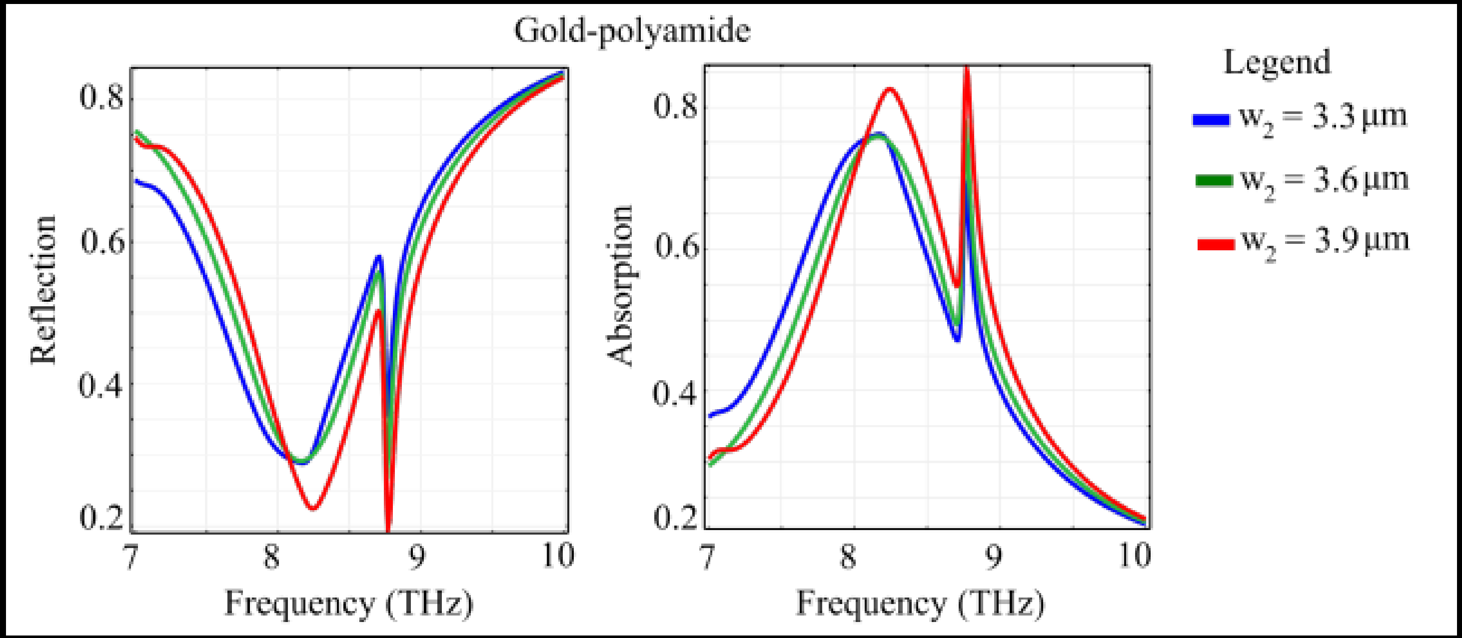




Spectral reflection and absorption of the gold-polyamide metasurface configuration, under variation of the thickness of the top rod w1.

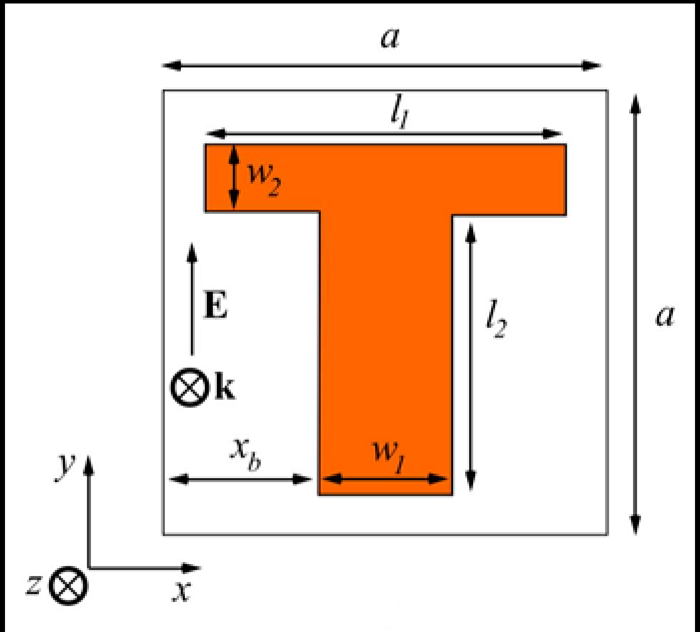
SIMULATIONS

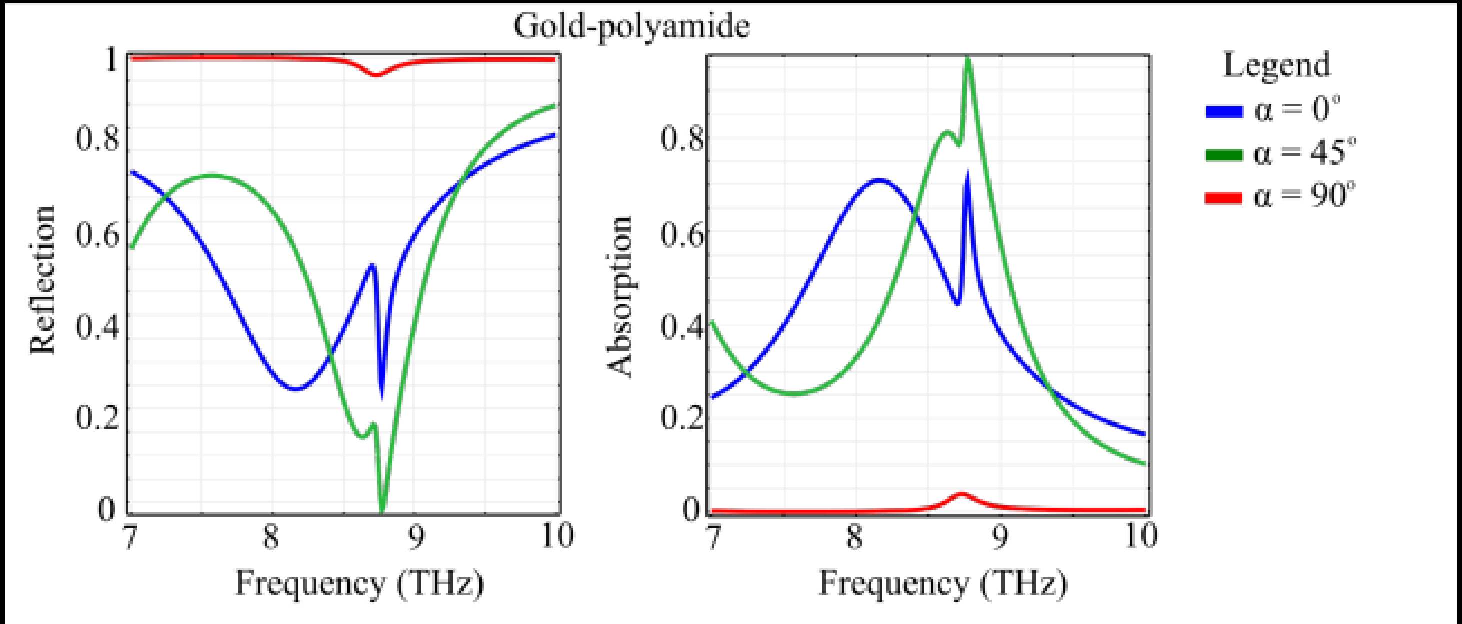




Spectral reflection and absorption of the gold-polyamide metasurface configuration under variataion of the thickness of the base rod w2.

SIMULATIONS





Spectral reflection and absorption of the gold-polyamide metasurface configuration under variation of the input linear polarization angle.

APPLICATIONS IN HPLS & OUTLOOK

Taking a central wavelength λ_0 for the electromagnetic field, the sizes of the unit metasurface cell elements have to be in the $\lambda_0/10$ to $\lambda_0/5$ interval.

Outlook: Obtain metasurfaces that provide control on reflection and absorption in the range 750 - 850 nm.

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THANK YOU FOR ATTENTION