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Title:Modulation of a surface plasmon-polariton resonance by subterahertz diffracted coherent phonons

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Abstract:Coherent sub-THz phonons incident on a gold grating that is deposited on a dielectric substrate undergo diffraction and thereby induce an alteration of the surface plasmon-polariton resonance. This results in efficient high-frequency modulation (up to 110 GHz) of the structure's reflectivity for visible light in the vicinity of the plasmon-polariton resonance. High modulation efficiency is achieved by designing a periodic nanostructure which provides both plasmon-polariton and phonon resonances. Our theoretical analysis shows that the dynamical alteration of the plasmon-polariton resonance is governed by modulation of the slit widths within the grating at the frequencies of higher-order phonon resonances.

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Inspec controlled terms:diffraction gratings - gold - nanostructured materials - periodic structures - phonons - polaritons - reflectivity - surface plasmon resonance

Uncontrolled terms:surface plasmon-polariton resonance modulation - subterahertz diffracted coherent phonons - coherent subterahertz phonon incident - gold grating - dielectric substrate - diffraction - surface plasmon-polariton resonance alteration - efficient high-frequency modulation - structure reflectivity - visible light - plasmon-polariton resonance vicinity - modulation efficiency - periodic nanostructure - dynamical alteration - slit width modulation - higher-order phonon resonance frequencies - frequency 110 GHz - Au

Inspec classification codes:A7320M Collective excitations (surface states) - A7820D Optical constants and parameters (condensed matter) - A7865E Optical properties of metals and metallic alloys (thin films/low-dimensional structures) - A6322 Phonons in low-dimensional structures and

small particles - A7136 Polaritons - A7320D Electron states in low-dimensional structures

Numerical data indexing:frequency 1.1E+11 Hz

Chemical indexing:Au/el

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Discipline:Physics (A)

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