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Title:A stretch-tunable plasmonic structure with a polarization-dependent response
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Abstract:We experimentally demonstrate a stretchable plasmonic structure composed of a monolayer array of gold semishells with dielectric cores on an elastic PDMS substrate. The composite structure is fabricated using simple and inexpensive self-assembly and transfer-printing techniques, and it supports Bragg-type surface plasmon resonances whose frequencies are sensitive to the arrangement of the metallic semishells. Under uniaxial stretching, the lattice symmetry of this plasmonic structure can be reconfigured from hexagonal to monoclinic, leading to resonance frequency shifts from 200 THz to 191 THz for the TM polarization and from 200 THz to 198 THz for the TE polarization with a strain up to 20%, respectively. Compared with previously reported tunable plasmonic structures, the reconfiguration of lattice symmetry offers a promising approach to tune the surface plasmon resonance with a polarization-dependent response at the standard telecommunication band, and such tunable plasmonic structure might be exploited in realizing photonic devices such as sensors, switches and filters.
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Inspec controlled terms:dielectric materials - gold - light polarisation - monolayers - plasmonics - polymers - self-assembly - surface plasmon resonance
Uncontrolled terms:stretch-tunable plasmonic structure - polarization-dependent response - monolayer - metallic semishells - dielectric cores - elastic PDMS substrate - self-assembly - transfer printing - Bragg-type surface plasmon resonances - uniaxial stretching - lattice symmetry reconfiguration - TM polarization - resonance frequency shifts - TE polarization - photonic devices - sensors - switches - filters - frequency 191 THz to 200 THz - Au
Inspec classification codes:A7320M Collective excitations (surface states) - A7865E Optical properties of metals and metallic alloys (thin films/low-dimensional structures) - A6817 Monolayers and Langmuir-Blodgett films
Numerical data indexing:frequency 1.91E+14 2.0E+14 Hz

Chemical indexing:Au/el
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