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Infrared Resonances in Plasmonic Nanorod and Nanoarc Antennas ANDREW LAWSON, University of Maryland, College Park, MD USA, CHASE ELLIS, JOSEPH TISCHLER, U.S. Naval Research Laboratory, Washington, DC USA, ODED RABIN, University of Maryland, College Park, MD USA — Tunability of the frequency and polarization of localized surface plasmon resonances (LSPR) of nanostructures is crucial for their implementation in nanophotonics applications such as photovoltaics, chiroptical spectroscopy, and infrared detection. We report spectroscopic data of plasmonic nanorods and nanoarcs collected by polarized Fourier transform infrared reflectance spectroscopy (FTIR). The effects of the nanostructure material, geometry and substrate material are investigated by patterning gold and aluminum structures with varying length on silicon and glass substrates, as well as on anodic aluminum oxide, a cost effective alternative to standard transparent substrates. By varying such parameters for straight rods and arcs, we find that the measured LSPR frequencies of our nanostructures span the mid-infrared spectral range (λ=2-12 microns). However, we find that bending the nanostructures (i.e., forming arcs rather than straight rods) results in additional resonances with unique polarizations not observed in straight nanorods. We find that the nanorods exhibit half-wave antenna behavior which can be modeled using antenna theory with a linearly scaled effective wavelength which accounts for structure dimensions and material.

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