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ANALYSIS OF A WIDE SPECTRAL RANGE PLASMONIC OUTLINE BOWTIE ANTENNA RANGING IN 0.3–5.0 μm

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Abstract—We numerically analyze a broadband plasmonic outline bowtie antenna over a large parameter space by means of finite element method with three-dimensional calculation. The antenna is composed of a pair of triangular gold with outline shape placed in close proximity to each another. We show how the structural parameters affect the antenna resonance conditions, such as peak resonances wavelengths, electric field intensities, propagation properties, component field and total field distributions, charge densities and electrical filed stream lines at spectral points of interest. In addition, the characteristics of transmittance spectral of a periodic antenna array corresponding to the bonding mode and anti-bonding mode are investigated as well. Simulation results show that it is possible to tune an antenna with a constant length over a wide spectral range (ranging in 0.3–5.0 μm or more range) while maintaining a constant antenna dimension, reduce the antenna footprint by a factor of 4.98, and increase the gap enhancement by 23%.

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