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Title:Waveguide-fed optical hybrid plasmonic patch nano-antenna

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Abstract:We propose a novel optical hybrid plasmonic patch nanoantenna for operation at the standard telecommunication wavelength of 1550 nm. The nano-antenna is designed to be compatible with a hybrid plasmonic waveguide through matching of both the operational mode and the wave impedance. The antenna is designed to receive the optical signal from a planar waveguide and redirect the signal out of plane, and is therefore useful for inter- or intra-chip optical communications and sensing. The transmission line model in conjunction with surface plasmon theory is used to develop analytical formulas for design and analysis, and a 3-dimensional full-wave numerical method is used to validate the design. The proposed device provides a bandwidth of more than 15 THz, a gain of 5.6 dB, and an efficiency of 87%. Furthermore, by designing an 8 x 8 array of the proposed antenna, a directivity of 20 dBi and steering of the beam angle are achieved by controlling the relative phase shift between elements of the array. © 2012 Optical Society of America.

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Uncontrolled terms:1550 nm - 3-dimensional - Analytical formulas - Beam angle - Design and analysis - Directivity - Nanoantennas - Operational modes - Optical communications and sensing - Optical hybrids - Optical signals - Out-of plane - Plasmonic - Plasmonic waveguides - Relative phase - Surface plasmons - Telecommunication wavelengths - Transmission line models - Wave impedances

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