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Guided-Wave Plasmon Polariton Modes in High-Index Dielectric Structures RACHEL OWEN, JANELLE LEGER, BRAD JOHNSON, Western Washington University — Interest in subwavelength waveguides has increased as the need to interface between optical signals and increasingly small electronic components grows. Surface plasmon polaritons (SPPs) are surface charge density oscillations localized to a metal-dielectric interface that confine energy to a structure that is not diffraction limited. Thus, structures that support SPPs are promising candidates for subwavelength waveguides. However, most of the electric field propagates along the metal interface, causing Ohmic damping to restrict use to short-range applications. Here we present an architecture that supports high index dielectric plasmon polariton modes (HID-PPMs). These structures utilize the metal-dielectric-metal-substrate structure of typical SPP waveguides. However, the core dielectric layer has a higher refractive index than the substrate. This small structural change causes the bulk of the electric field to be concentrated in the dielectric region resulting in a dramatic reduction of damping effects. Here we present experimental evidence of HID-PPMs in a simple trilayer structure. Our results match model predictions with remarkable accuracy using minimal parameter modifications. We discuss these results as well as the potential applications of these devices.

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