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Plasmon Polariton Modes in High Index Dielectric Structures TREVOR MORGAN, MATT OOSTMAN, ZACH GRAEBER, BRAD JOHNSON, STEVE MCDOWALL, JANELLE LEGER, Western Washington University — The need to interface optical signals with increasingly small electronic components has led to an interest in subwavelength waveguides. Waveguides based on the excitation of surface plasmon polaritons (SPPs) are promising for short-range applications. However, in these structures Ohmic damping significantly limits propagation length. High index dielectric plasmon polariton modes (HID-PPMs) are surface-constructed waves that exist in structures having a core dielectric layer with a higher refractive index than the glass substrate. Modes in this region exhibit oscillatory electric fields with the bulk of their electric field confined in the dielectric layer, similar to a TIR waveguide. Damping losses may therefore be drastically reduced in such structures. Unlike TIR waveguides, HID-PPMs can be excited along the full length of the waveguide, improving device versatility. Here we report the observation of HID-PPMs in Au/TiO2/Au structures using attenuated total reflection measurements. Results are in good agreement with theory. Waveguides based on HID-PPMs have the potential to improve a broad range of applications which rely on low loss energy transmission or compatibility with nanoscale components, such as telecommunications, optical signal processing, and solar concentration.

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