Abstract Submitted for the MAR10 Meeting of The American Physical Society

Guided Wave Plasmon Polariton Modes in Trilayer Structures MATTHEW OOSTMAN, TREVOR MORGAN, BRAD JOHNSON, STEPHEN 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), or optically coupled plasmons, at dielectric-metal boundaries have been demonstrated, but the loss of energy due to Ohmic damping effects in the metal limits propagation length. Guided wave plasmon polariton modes (GWPPMs) are theoretically predicted surface-constructed waves that can exist in structures composed of a central dielectric layer separating two metallic layers. Because the bulk of the energy is confined to the dielectric, losses due to damping may be drastically reduced. Here we report the observation of SPPs in trilayer Au/SrTiO3/Au structures, for which GWPPMs are theoretically predicted to exist for visible light. Experimental observations are in good agreement with theory. Waveguides based on GWPPMs have the potential to improve a broad range of applications such as telecommunications, optical signal processing, and solar concentration which rely on low loss energy transmission or compatibility with nanoscale components.

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Date submitted: 20 Nov 2009

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