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Ultra-long range surface plasmon modes¹ CHARLES G. DURFEE, REUBEN T. COLLINS, THOMAS E. FURTAK, Colorado School of Mines, RUSSELL E. HOLLINGSWORTH, ITN Energy Systems — It is well known that the propagation length of surface plasmon waves can be extended by exciting the appropriate mode of an isolated noble metal layer. The losses, however, increase substantially as the refractive index of the surrounding medium increases. Using a transfer matrix calculation, we have discovered that a thin, low-index dielectric adjacent to the metal layer can increase the intrinsic propagation length arbitrarily as the bound mode approaches cutoff. This geometry can be implemented in structures that combine metal-oxide-semiconductor (MOS) fabrication with plasmonic waveguides.

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