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Surface Plasmon Propagation in Nanostructured Metallic Waveguides Y.M. CALM, J.M. MERLO, A.H. ROSE, N.T. NESBITT, A.M. BOYCE, G. MCMAHON, M.J. BURNS, K. KEMPA, M.J. NAUGHTON[1], Boston College — Visible frequencies of light can be routed on subwavelength scales with nanostructured, metallic waveguides by coupling optical energy to surface plasmon (SP) modes at a metal-insulator interface. Epitaxially-grown Ag nanowires and nanocoaxes provide a low-loss, "model" system to characterize the propagation of SP waves. We have studied these structures by electron, focused ion, scanning probe, and optical microscopies, and have observed propagation lengths exceeding $15\lambda_{vac}$ with confinement on the order of $0.07(\lambda_{vac})^2$. Experimental efforts towards lithographically-fabricated metal-insulator-metal waveguides are discussed. Finally, an architecture for a nanocoax-based optical microscope,[2] which extracts near-field (evanescent) information and propagates it into the far-field, is presented.

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[2]K. Kempa, X. Wang, Z. F. Ren, and M. J. Naughton, *Appl. Phys. Lett.* **92**, 043114 (2008)

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