Experimental Observations of Nanoscale Coaxial Waveguides (Nanocoax) at Optical Frequencies

Y.M. CALM, F. YE, J.M. MERLO, A.H. ROSE, N.T. NESBITT, C. YANG, N. DRACHMAN, G. MCMAHON, M.J. BURNS, K. KEMPA, M.J. NAUGHTON, Boston College — The localization and transport of optical energy on subwavelength scales is facilitated by using nanostructured, metallic waveguides. The coaxial cable has no cutoff frequency for the fundamental, TEM-like mode, even up to optical frequencies where this mode obtains plasmonic/polaritonic character, and is therefore a natural choice for miniaturization. Epitaxially grown Ag nanowires and nanocoaxes were studied by electron- and focused ion beam microscopies, and their transmission of visible frequencies of light was characterized by optical microscopy. Experimental efforts towards lithographically fabricated nanocoaxes are discussed. Finally, an architecture for a nanocoax-based optical microscope, which extracts near-field (evanescent) information and propagates it into the far-field, is presented.

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