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Three-dimensional subwavelength imaging with phase-less power extinction tomography. ALEXANDER A. GOVYADINOV, GEORGE Y. PANASYUK, JOHN C. SCHOTLAND, University of Pennsylvania — Modern near-field methods extend the spatial resolution of optical microscopes beyond the classical diffraction limit. However the majority of these methods only recover two-dimensional maps of optical intensity near the sample surface. The interpretation of these maps for manifestly inhomogeneous samples has been proven to be problematic. Here we derive an analytical technique which allows unique subwavelength 3D reconstruction of both real and imaginary parts of susceptibility of an inhomogeneous sample. Our technique is based upon the solution to the linearized near-field inverse scattering problem arising in the sample – near-field tip system. The proposed approach requires neither phase measurements nor control over the phase of illuminating fields. The reconstruction is based on simple measurements of the power extinguished from illuminating waves in the total internal reflection mode and is intrinsically nondestructive.

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