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Optical conductivity of MnN: a combined experimental and theoretical study. WALTER R. L. LAMBRECHT, Case Western Reserve University, S. GRANVILLE, B. J. RUCK, F. BUDDE, A. KOO, J. E. DOWNES, H. J. TRODAHL, Victoria University of Wellington, A. BITTAR, N. STRICKLAND, G. V. M. WILLIAMS, Industrial Research Limited, Lower Hutt, NZ, TIMOTHY LEARMONT, KEVIN E. SMITH, Boston University, V. J. KENNEDY, A. MARKWITZ, Inst. Geol. and Nuclear Sciences, Lower Hutt, NZ — A comparison between measured and calculated optical conductivity is presented for MnN films prepared by ion assisted deposition. X-ray diffraction and extended x-ray absorption fine structure show the films to be nanocrystalline but phase pure. X-ray emission spectroscopy of the N K-edge and X-ray absorption near edge spectroscopy of the N K- and Mn L-edges are used to probe the occupied and empty densities of states, which compare well with the N-2p and Mn-3d partial densities of states calculated using the linearized muffin-tin orbital method. The optical conductivity was measured by spectroscopic ellipsometry/reflectivity in the infrared to UV range. The major differences between calculated and measured spectra can be understood on the basis of a limited electron mean-free-path in these nanocrystalline films, which relaxes the momentum conservation requirement. The calculated optical functions are analyzed in terms of their dominant band-to-band contributions including the polarization dependence. The temperature dependent conductivity shows a clear metallic behaviour and a weak Kondo-like low temperature anomaly.

Walter R. L. Lambrecht
Case Western Reserve University

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