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Anomalous optical properties of a multiband metal due to thermal redistribution: The case of $SrMnSb_2$ H. J. PARK, LUKE J. SANDILANDS[1], CCES-IBS Dep. of Physics and Astronomy, SNU, J. S. YOU, Dep. of Physics, POSTECH, HYO SEOK JI, Dep. of Chemistry, POSTECH, C. H. SOHN, CCES-IBS Dep. of Physics and Astronomy, SNU, J. W. HAN, Dep. of Physics and Photon Science, School of Physics and Chemistry, GIST, S. J. MOON, Dep. of Physics, Hanyang Univ., K. W. KIM, Dep. of Phyisics, Chungbuk National Univ., J. H. SHIM, Dep. of Chemistry Division of Advanced Nuclear Engineering, POSTECH, JUN SUNG KIM, Dep. of Physics, POSTECH, T. W. NOH[2], CCES-IBS Dep. of Physics and Astronomy, SNU — We report an optical spectroscopic study of $SnMnSb_2$, a low carrier density metal. As temperature is decreased, our measurements reveal a large increase in the free carrier plasma frequency, which is unusual for a metal. This seemingly anomalous behavior can be accounted for using a 'three band' model of the multiband electronic structure of $SrMnSb_2$ that includes two conduction bands and one valence band close to the Fermi level. The temperature dependence of the low-lying interband optical transitions and the Hall number can also be understood using our model. Our results provide a possible explanation for the puzzling optical properties that have been reported in a number of topical low carrier density metals and semimetals.

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