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Carrier recombination in mid-wave infrared InAs/InAsSb superlattices YIGIT AYTAC, University of Iowa, BENJAMIN VARBERG OLSON, JIN K. KIM, ERIC A. SHANER, SAM D. HAWKINS, JOHN F. KLEM, Sandia National Laboratories, MICHAEL E. FLATTÉ, THOMAS F. BOGGESS, University of Iowa — Measurements of carrier recombination rates using a temperature-dependent time-resolved differential transmission technique are reported for mid-wave infrared $InAs/InAs_{1-x}Sb_x$ type-2 superlattices (T2SLs). By engineering the layer widths and antimony compositions a 16K band-gap of $\sim$ 238 meV was achieved for all five unintentionally doped T2SLs. Carrier recombination rates were determined for all five samples by fitting a rate equation model to the density and temperature dependent data. Minority-carrier lifetimes as long as $22\mu s$ were measured at 14K, while lifetimes in excess of $2\mu s$ were measured for all five samples at 200K. The minority-carrier lifetimes were observed to generally increase with increasing antimony content. While minority-carrier lifetimes are much longer than those observed in InAs/Ga(In)Sb T2SLs, Auger recombination processes were found to be more prominent in the Ga-free T2SLs. Sandia National Laboratories is a multiprogram laboratory managed and operated by Sandia Corporation, a wholly owned subsidiary of Lockheed Martin Corporation, for the U.S. Department of Energy's National Nuclear Security Administration under Contract No. DE-AC04-94AL85000. This research was funded by the U.S. Government.

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