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Long Minority Carrier Lifetimes in InAs/InAsSb Type-II Superlattices[1] YIGIT AYTAC, University of Iowa, BENJAMIN OLSON, JIM K KIM, ERIC A SHANER, SAMUEL HAWKINS, JOHN KLEM, Sandia National Laboratories, MICHAEL FLATT, THOMAS F BOGGESS, University of Iowa, UNIVERSITY OF IOWA COLLABORATION, SANDIA NATIONAL LABORATORIES COLLABORATION — Three unintentionally doped MWIR InAs/InAsSb type-II superlattices (T2SLs) were designed and grown to have 15 % Sb content in their alloy layers. The individual layer thicknesses of InAs and InAsSb are systematically altered in configurations of 174/218, 87/109, and 65/82 (Å/Å) while the total absorber thickness is nominally 4 μm and the bandgap is approximately 5.2 μm for all the samples. A time- and temperature- dependent differential-transmission technique was used to evaluate the carrier lifetime of each of the samples. Significantly long minority carrier (MC) lifetimes of ˜14 μs and ˜19 μs were obtained for the sample with 174 Å /218 Å InAs/InAsSb layer ratio at the temperatures of 77 K and 125 K, respectively. The defect energy levels of the InAs/InAsSb T2SLs reported here are determined to be ˜300 25 meV relative to InAs valance band edge strained to GaSb. Additionally, the electron dominated Auger coefficients, $C_{n,}$ are obtained from the excess carrier density and temperature dependent recombination rate data. These coefficients are found to increase with decreasing individual layer thickness values from 3.4 to 29.9 x 10^{-27} cm^6/s at 77 K.

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