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Accurate determination of the temperature dependent thermalization coefficient (Q) in InAs/AlAsSb quantum wells HAMIDREZA ESMAIELPOUR, JINFENG TANG, VINCENT R. WHITESIDE, SANGEETHA VIJEYARAGUNATHAN, TETSUYA D. MISHIMA, MICHAEL B. SANTOS, IAN R. SELLERS, University of Oklahoma — We present an investigation of hot carriers in InAs/AlAsSb quantum wells as a practical candidate for a hot carrier solar cell absorber. The thermalization coefficient (Q) of the sample is investigated using continuous wave photoluminescence (PL). The Q is accurately determined through transfer matrix calculations of the absorption, analysis of the power density, penetration depth, diffusion, and recombination rates using a combination of simulation and empirical methods. A precise measurement of laser spot size is important in order to determine the absorbed power density. Simulations were performed based on our PL geometry in order to calculate the excitation spot size, which was compared with experiment by measurements using variable diameter pinholes to determine beam radius. Here, these techniques are described, in addition to, the temperature dependent hot carrier dynamics and phonon mediated thermalization coefficient for the InAs/AlAsSb quantum well structure.

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