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InAs quantum wells with $AlAs_{0.16}Sb_{0.84}$ barriers and $GaAs_{0.09}Sb_{0.91}$ absorber for hot carrier and multicarrier generation solar cell VINCENT R. WHITESIDE, SANGEETHA VIJEYARAGUNATHAN, TETSUYA D. MISHIMA, MICHAEL B. SANTOS, IAN R. SELLERS, University of Oklahoma, TOBIAS ZEDERBAUER, GOTTFRIED STRASSER, Technische Universität Wien — We present an investigation of a series of InAs/$AlAs_{0.16}Sb_{0.84}$ superlattice structures tuned to 0.7 eV to facilitate the study of carrier multiplication and hot carrier effects in the narrow gap material. The alloy composition of the barrier materials is designed such that photons of over three times the well energy gap are absorbed in the InAs wells. Three distinct structures are studied: 1) a superlattice composed of multiple wells and barrier material, 2) a hybrid structure composed of a $GaAs_{0.09}Sb_{0.91}$ bulk absorber with a superlattice structure, and 3) a bulk heterostructure of $GaAs_{0.09}Sb_{0.91}$ with an energy matched to the superlattice, as reference. Power and temperature dependent photoluminescence measurements will be presented to describe the relative (hot) carrier temperatures, and their potential for next generation solar cells. With this in mind, the performance of solar cells based on these designs will also be presented.

Tetsuya D. Mishima
University of Oklahoma

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