Abstract Submitted
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Ultra-long minority carrier lifetime and ultra-low interface recombination velocity in CdTe/MgCdTe double heterostructures grown by molecular beam epitaxy[1] XIN-HAO ZHAO, SHI LIU, CALLI CAMPBELL, MAXWELL LASSISE, YUAN ZHAO, YING-SHEN KUO, YONG-HANG ZHANG, Arizona State Univeristy, ASU MBE GROUP TEAM — CdTe/MgCdTe double heterostructures (DHs) are grown on InSb (001) substrates using molecular beam epitaxy (MBE). The MgCdTe layers act as barriers to confine both electrons and holes in CdTe. The undoped intrinsic n type DHs show very high crystalline quality, strong photoluminescence, a minority carrier lifetime as long as 2.7 μs, and an interface recombination velocity as low as <1 cm/s. These values are already comparable to that of the best quality GaAs/AlGaAs DHs. The effective interface recombination velocity is found to be dependent on not only the Mg composition but also the thickness of the MgCdTe layer, due to thermionic emission and tunneling effects. The CdTe/MgCdTe DH samples are also doped with indium from 1×10^{16} cm^{-3} to 5×10^{18} cm^{-3}, and the dopants are founds to be 100% ionized within the doping range from 1×10^{16} cm^{-3} to 1×10^{18} cm^{-3}. Decent carrier lifetimes are achieved ($\sim$100 ns) with doping concentrations from 1×10^{16} cm^{-3} to 1×10^{17} cm^{-3}, which indicates the potential application of this structure in high efficiency CdTe solar cells.

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