

Experimental determination of band overlap in type II InAs/GaSb superlattice based on temperature dependent photoluminescence signal

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Type II InAs/GaSb superlattice (SL) material has been widely used to make infrared photodetectors. In addition, this material system may play a unique role for some fundamental studies like spin-orbit interaction, topological insulator, and novel exciton condensates. A fundamental parameter of the material [1,2], the band overlap at the interface between InAs and GaSb, should be known. We have determined the band overlap in type II InAs/GaSb SL structure based on the temperature dependent photoluminescence (PL) results of a short-wave SL sample. The band overlap value is treated as a temperature variable and is simulated by fitting the PL peak position using the 8KP method. It is found that the band overlap monotonically decreases from 0.325 to 0.225 eV when temperature is increased from 12 to 90 K [3]. The calculated e1-hh1 transition using the obtained band overlap data shows an agreement with the PL results of another SL sample.

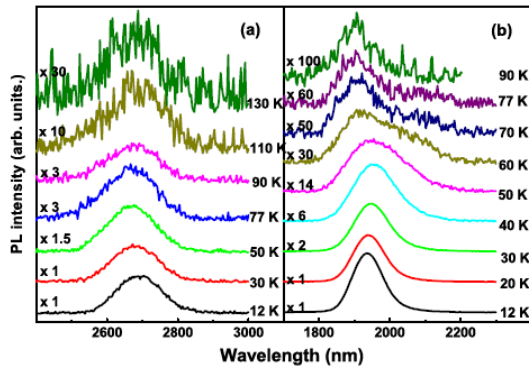


Fig. 1. Temperature dependent PL spectra of samples *a* and *b*. The structure is 8 Å InAs/ 21 Å GaSb for sample *a* and 8 Å InAs/ 9 Å GaSb/ 4 Å AlSb/ 9 Å GaSb for sample *b*.

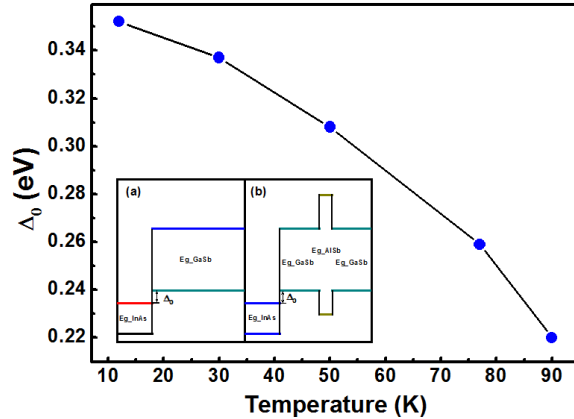


Fig. 2. The temperature dependence of the band overlap between InAs and GaSb. The inset (a) and (b) are the schematic drawing of the band structure of samples *a* and *b*, respectively.

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