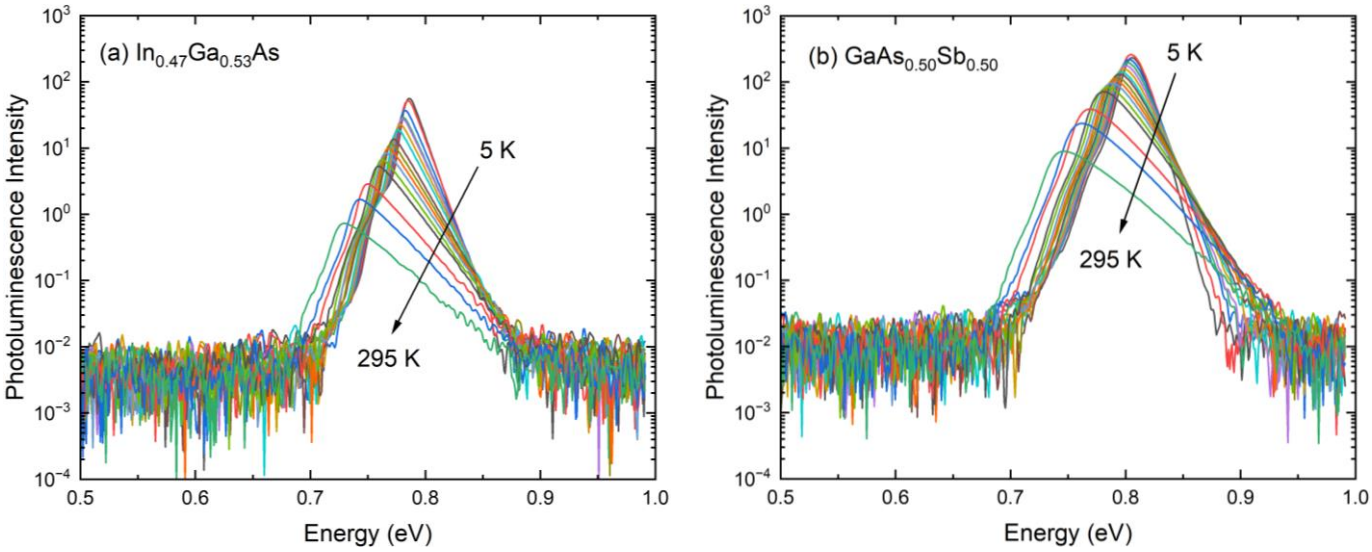

Fig. 1 Photoluminescence spectra for unintentionally doped $In_{0.47}Ga_{0.53}As$ (a) and $GaAs_{0.50}Sb_{0.50}$ (b) on InP substrate as a function of temperature from 5 K to room temperature.

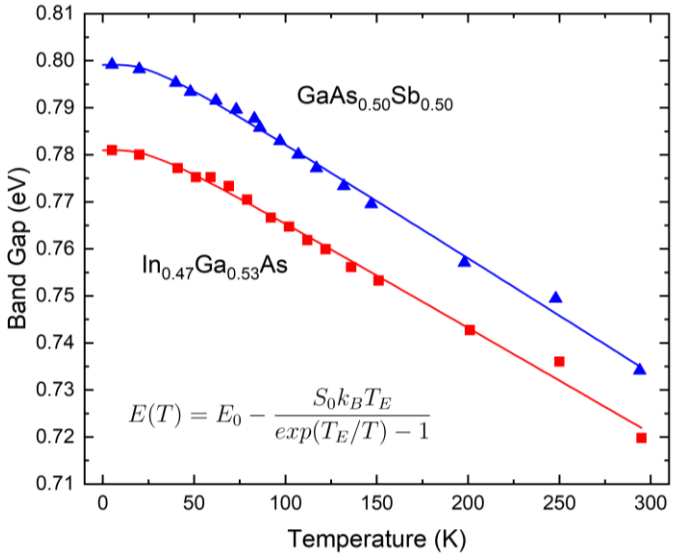

Fig. 2 Temperature-dependent band gap extracted from photoluminescence for both $In_{0.47}Ga_{0.53}As$ and $GaAs_{0.50}Sb_{0.50}$ samples lattice matched to InP (triangles and squares). The data was fit to the Einstein single oscillator equation shown for each sample (solid lines).

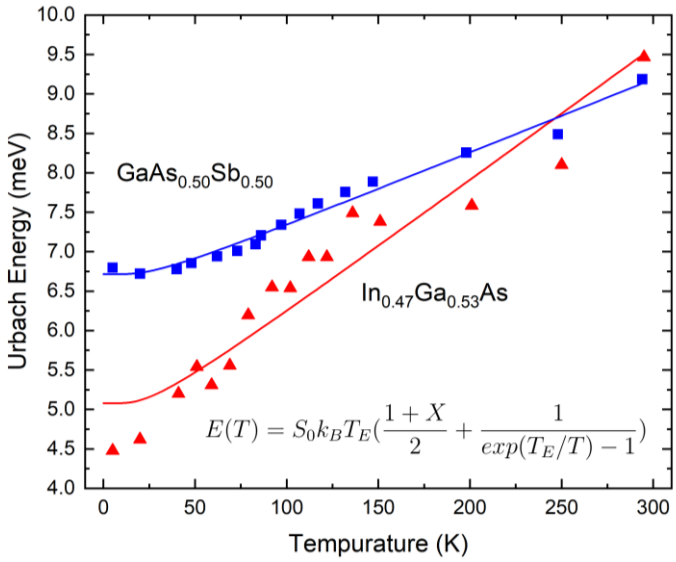

Fig. 3 Urbach Energy extracted from the sub band gap slope of the photoluminescence as a function of temperature for both $In_{0.47}Ga_{0.53}As$ and $GaAs_{0.50}Sb_{0.50}$ samples lattice matched to InP (triangles and squares). The data was fit to the Einstein single oscillator equation shown for each sample (solid lines).

Table 1 Einstein single oscillator fit parameters for the band gap as a function of temperature for unintentionally doped $In_{0.47}Ga_{0.53}As$ and $GaAs_{0.50}Sb_{0.50}$.

Sample	T_E (K)	S_0	E_0 (meV)
GaAsSb	70	2.855	779.1
InGaAs	69	2.618	781.0

Table 2 Einstein single oscillator fit parameters for the Urbach Parameter as a function of temperature for unintentionally doped $In_{0.47}Ga_{0.53}As$ and $GaAs_{0.50}Sb_{0.50}$.

Sample	T_E (K)	S_0	X
GaAsSb	75	0.109	18.04
InGaAs	69	0.196	7.65