

Evaluation of effective mass in InGaAsN/GaAs quantum wells using transient spectroscopy

In this manuscript, a method to evaluate the effective mass in quantum well heterostructures is proposed. Infinite well QW model is adopted to explain the measuring results from transient spectroscopy. It is of importance to understand the effective mass in QWs structures, especially in electro-optical devices. This manuscript can be more informative if a few adjustments are made.

Question:

1. [Eq. (4)] The main discussion is based on the temperature dependent transient spectroscopy measurement, in which there is a 450 K difference in temperature. Should the thermal expansion of thickness " d " of InGaAsN taken into the consideration in the evaluation of effective mass.
2. [line-116] Could the origin of defect states be identified? i.e. What type of structural defects, and can it be pointed out in the HRXRD data sets? And can the width of the defect's energy level be determined?
3. [supplementary] (a) Could authors provide a table of samples with their description of thickness, doping percentage and the according measurement number(NI--n). (b) A figures caption or description is appreciated in S3 for better understanding of four sub-figures in a data set.
4. [line-124] With the description of "At enough high temperature...", could authors provide a range of temperature which is viable for model to fit in? [line-131] the energy offset affected by dopant percentage is estimated to be 289 meV in the case of $x=0.32\%$, $y=13.3\%$, and $d=16.6$ nm, could authors show how the number of offset is calculated?