Structural characterisation of $In_{0.53}Ga_{0.47}As$ using EXAFS

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$In_xGa_{1-x}As$ has recently been shown to have an anomalous amorphisation behaviour. Unlike other ternary alloys, such as $Al_xGa_{1-x}As$, $In_xGa_{1-x}As$ does not exhibit amorphisation kinetics intermediate between the two binary extremes. Extended X-ray absorption fine structure measurements were utilised to determine the structural parameters of $In_{0.53}Ga_{0.47}As$ and $In_{0.75}Ga_{0.25}As$ and the results compared with EXAFS measurements on InAs, GaAs and $Al_{0.50}Ga_{0.50}As$. $In_xGa_{1-x}As$ was found to exhibit a bimodal bond length distribution as has been previously suggested. The absence of a second nearest neighbour-peak in $In_{0.53}Ga_{0.47}As$ compared with InAs, GaAs and $Al_{0.5}Ga_{0.5}As$ indicates greater disorder at the second nearest neighbour in the form of increased distortion in the bond length and bond angle distributions, leading to strain at the microscopic level. Bond angles determined from the EXAFS measurements were shown to be in agreement with the above. We attribute the anomalous $In_xGa_{1-x}As$ amorphisation to this local strain.