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An anomaly in a formula to calculate the refractive index of $\text{Al}_x\text{Ga}_{1-x}\text{As}$

A formula to calculate the refractive index n of $\text{Al}_x\text{Ga}_{1-x}\text{As}$ was proposed by Adachi in 1985. This formula takes into account the variation of the band gap E_g of $\text{Al}_x\text{Ga}_{1-x}\text{As}$ as function of the Al mole fraction x . Consequently there are two equations for the calculation of the band gap, viz. for x less than 0.45 and x from 0.45 to less than 1. The refractive index is used to calculate the thickness of epilayers of $\text{Al}_x\text{Ga}_{1-x}\text{As}$ grown by metallorganic vapour phase deposition, whereafter infrared reflectance spectra were obtained from respective samples with various mole fractions. The mole fraction x can also be obtained from the reflectance spectra. When calculating the required refractive indexes, the applicable equation for the band gap should be used depending on whether x is less than 0.45 or whether x is greater than 0.45 but less than 1. An anomaly was observed when the epilayer thickness was calculated using the formulation of Adachi, and results will be presented to demonstrate the anomaly.

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None

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