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Nitrogen dependence of the GaAsN interband critical points E_1 and $E_1+\Delta_1$ determined by spectroscopic ellipsometry

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The effects of the nitrogen concentrations on the E_1 and $E_1+\Delta_1$ transitions of tensile-strained GaAs_{1-y}N_y (0.1% $\leq y \leq$ 3.7%) grown pseudomorphically to GaAs by metalorganic vapor-phase epitaxy are studied by spectroscopic ellipsometry. Adachi's critical-point composite model is employed for ellipsometry data analysis. Contrary to the well-known redshift of the band-gap energy E_0 , we observe linearly blueshifted E_1 and $E_1+\Delta_1$ transition energies with increasing nitrogen composition y . For nitrogen compositions of 0 $\leq y \leq$ 1.65%, the observed blueshift of the E_1 energy is well explained by the sum of the effects of biaxial (001) strain and alloying. © 2000 American Institute of Physics.

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