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Investigation of segregation by quantitative transmission electron microscopy

Marco Schowalter, Andreas Rosenauer, Dimitri Litvinov, Dagmar Gerthsen

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Abstract

The segregation effect occurring during molecular beam epitaxy and metalorganic vapour phase epitaxy growth of ternary III-V semiconductor heterostructures was investigated by quantitative transmission electron microscopy (QTEM) and by simulation of optical properties. The concentration distribution of various III-V semiconductor heterostructures was measured by QTEM and averaged along the direction perpendicular to the growth direction. Resulting concentration profiles could be well fitted using the model of Muraki *et al.* (Muraki K., Fukatsu S., Shiraki Y., Ito R., Appl. Phys. Lett. 61(5), 1992, p. 557) yielding the segregation efficiency R . For the investigation of the effect of segregation on the photoluminescence, concentration profiles for different segregation efficiencies were simulated and photoluminescence peak energies were derived by solving Schrödinger's equation for spatially varying potentials deduced from the measured concentration profiles.



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