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Self-assembly of compositionally modulated Ga_{1-x}Mn_xAs multilayers during molecular beam epitaxy

Appl. Phys. Lett. **103**, 192113 (2013); <https://doi.org/10.1063/1.4829922>S. Gallardo-Hernández^{1, a),b)}, I. Martinez-Velis¹, M. Ramirez-Lopez¹, Y. Kudriatsev², A. Escobosa-Echavarria², S. Luiz Morelhao³, and M. Lopez-Lopez¹[View Affiliations](#)[View Contributors](#) PDF

ABSTRACT

GaMnAs structures were grown on GaAs(100) substrates by molecular beam epitaxy employing different growth parameters. We studied manganese incorporation employing secondary ion mass spectrometry (SIMS). At a growth temperature of 300 °C, we observed a self-assembled modulation of the manganese concentration. SIMS depth profiles were analyzed employing a depth resolution function taking into account sputtering-induced broadening of the original distribution and segregation. We found a Mn segregation length along the growth direction of ~4 nm. The presence of GaMnAs multilayers was corroborated by high-resolution x-ray diffraction. Spinodal decomposition is a possible mechanism for the spontaneous formation of the multilayer structure.

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