Department of Electronic Engineering

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Research

My research is on the semiconductor materials focusing on group III-V semiconductor compounds. The objective is to investigate the molecular beam epitaxial (MBE) growth of the dilute nitride compound semiconductor InGaAsN using an electron cyclotron resonance (ECR) nitrogen plasma source. Basically, it about the strain cancellation by adding indium to GaAs1-yNy epitaxial layers as a method of calibrating the nitrogen fraction y. The aim was to determine the In fraction x in an InxGa1-xAs1-yNy epitaxial layer which exactly cancels the strain present in a GaAs1-yNy layer with the same nitrogen content when grown on a GaAs substrate. This is an alternative to asserting nitrogen fractions in GaAs1-yNy layers on the basis of x-ray measurements, when the values and linearity of lattice and elastic constants with nitrogen composition y has not been established. The GaAs1-yNyand InxGa1-xAs1-yNy layers were grown on GaAs (001) substrates using molecular beam epitaxy with an electron cyclotron resonance nitrogen plasma source. Layers have been assessed by high-resolution x-ray diffraction to determine the relationship between the lattice constant of the GaAs1-yNy layer and the fraction x of In required to exactly cancel the strain.