MOLECULAR BEAM EPITAXIAL GROWTH OF GaAs/GaInNAsSb CORE-MULTISHELL NANOWIRES

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III-V semiconductor nanowires (NWs) are expected to be next-generation optical and electronic devices with superior electron mobility and photoelectric conversion efficiency. Dilute nitride GaInNAs is considered as a promising material due to the tunability of its lattice constant and band gap with incorporation of In and small amounts of N. GaInNAsSb, introducing Sb to GaInNAs, is expected to be a material of interest due to the improvement of crystal quality with Sb as a surfactant and the decrease of its band gap. We here report the growth of GaAs/GaInNAsSb core-multishell NWs using plasma-assisted molecular beam epitaxy and investigate their properties by scanning electron microscopy, X-ray diffraction, and room temperature photoluminescence (PL). 5 series of samples were grown on Si(111) substrates grown at different Sb beam equivalent pressures (BEPsb) between 0 to 3×10-5 Pa. We observed clear formation of NWs which have the length of approximately 3 μm and the diameter of 400 nm. The x-ray diffraction showed the shift of the GaAs(111) peaks with the increase of Sb BEP. The figure shows the result of PL measurements of GaAs/GaInNAsSb and GaAs/GaInNAs core-multishell NWs. We observe clear emission peaks at wavelengths between 1180 and 1450 nm with the increase of Sb BEP at the growth. This result indicates promising properties of GaInNAsSb NWs for its application to telecommunication devices.