[총회초청 I]

Migration Enhanced Epitaxial Growth of Quantum Wire Array and Its Magneto-Optical Analysis

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The GaAs/Al0.5Ga0.5As quantum wire vertical superlattices (QWR) whose QWR widths varying from 15 to 60 molecules have been grown by migration enhanced epitaxial method (MEE) using molecular beam epitaxy system on vicinal GaAs substrate. The results of atomic force microscopy and transmission electron microscopy analyses on QWR structure are revealed with the growth conditions.

Also presented is the results on magneto-optical analysis of electronic properties of this quasi-one dimensional (1D) system. The anomalous linewidth change and the cyclotron orbit orientation dependence of Landau shift in magneto-photoluminescence (PL) at 4 K show the quasi-2D interaction in electron and hole coupling. The field dependence of the shifts in PL excitation spectroscopy also shows the excitation binding energy similar to 2D coupling. These are indicative that the electron-hole coupling is dominated by inter-wire interaction in this short-period narrow QWR 1D array.

Also revealed is the Zeeman results obtained from the polarization dependent magneto-PL experiment. The preliminary results indicate that the interaction between electronic spin and Landau orbital momentum, which shows a quantized behavior related to the Landau gauge invariance to the QWR array period, a unique phenomena of 1D periodic system.

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