**Effects of GaAs/In$_{0.1}$Ga$_{0.9}$As strained layer on the optical properties of multiple-stacked InAs/GaAs quantum dots**

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Multiple-stacked InAs/GaAs quantum dots (QDs) were grown by molecular beam epitaxy (MBE) and their optical properties were investigated by photoluminescence (PL) spectroscopy. To investigate the effects of GaAs(2 nm)/In$_{0.1}$Ga$_{0.9}$As(2 nm) strained layer on the optical properties of multiple-stacked InAs/GaAs QDs, the 10 periods of the GaAs/In$_{0.1}$Ga$_{0.9}$As strained layer was grown on the GaAs buffer layer and InAs QDs layer, respectively. The PL peak positions of the multiple-stacked GaAs/InAs QDs embedded in GaAs/In$_{0.1}$Ga$_{0.9}$As strained layer were blue-shifted with narrowing of the full width at half maximum (FWHM) compared to that of multiple-stacked GaAs/InAs QDs embedded in GaAs barriers. The rapid thermal annealing (RTA) treatments on the InAs QDs embedded in the GaAs/In$_{0.1}$Ga$_{0.9}$As strained layer were performed for 30 s at temperature ranging from 600 °C to 850 °C. The PL spectra of the InAs QDs show blue-shifts of about 50 meV with increasing annealing temperature up to 850 °C. At annealing temperature of 600 °C, the FWHM of the PL peak is reduced to 16 meV and PL intensity is enhanced compared to those of the as-grown sample, which indicates improvement of size uniformity and crystal quality of the QDs.