

Optical Characteristics of GaAs/Al_{0.3}Ga_{0.7}As Quantum Dots Grown by Droplet Epitaxy

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By using the droplet epitaxy (DE) method, GaAs/Al_{0.3}Ga_{0.7}As quantum dots (QDs) were grown. To investigate the optical properties, temperature and power density dependence of photoluminescence (PL) were carried out. The three Gaussian shapes are observed in the PL spectra. The each PL peak position is red-shifted as the temperature is increased from 11 to 180 K. The integrated PL intensity of the three PL peaks are fitted with the Arrhenius equation. It is found that the activation energy at different emission energy is varied according to the size of QDs. Also power density dependent PL at different temperatures were carried out. The superlinearity appears even at low temperature due to defect level. As increasing the temperature, the superlinearity became stronger caused by the Auger process. Finally, the PL peak position and the full width at half maximum (FWHM) at different emission energy as a function of temperature are investigated.