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Optical properties of vertically coupled InAs self-assembled quantum dots

조은태, 이희덕*, 이창명, 이상준, 노삼규, 이주인**, 한익기***, 정순일, 임재영****
*충남대학교 전자공학과, **한국표준과학연구원 나노표면 그룹, ***Korea Institute of Science & Technology, ****인제대학교 나노공학과

We studied the optical properties of two layers of InAs self-organized quantum dots (QDs). The QDs were separated by the GaAs barrier with varied the thickness from 2.5 to 20nm. All samples were observed double peaks from low-temperature photoluminescence spectra. The energy difference between two peaks shows that the origin of the double peaks is different for each sample. In case of the thin barrier thickness, the couple of peaks are come from the asymmetric (higher energy) and symmetric (low energy) states of the coupled double QDs. In the thick thickness, the double peaks are originated from the ground and excited states because the barrier is thick enough to separate the double QDs. Also, we observed that the full width half maximum of QDs spectra reduced with decreasing the barrier thickness due to the coupling between the interdots.