【심포지움-포토닉스 03】

Real-time, in situ monitoring of 5-fold InAs/InP quantum dot stacks by spectral reflectance

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InAs/InP quantum dots (QDs) stacks were formed by metalorganic chemical vapor deposition and the entire growth processes were monitored by *in situ*, real-time spectral reflectance (SR). It was found that dot size increased and the size distribution became narrower in the second dot layer when the spacer layer thicknesses were 10 and 20 nm, as measured by atomic force microscopy and transmission electron microscopy. However, QD size and the standard deviation in the third layer increased abruptly when spacer layer thickness was 10 nm. No changes in QD size, density and uniformity in the second and higher layers were observed with 50 nm spacers. It was also found that the SR spectra during stacked QD growth showed unique features at each step. The peaks at around 2.1 and 2.9 eV, attributed to In- and P-dimer related peaks, respectively, were clearly observed at various steps [1]. Morphological transition from two-dimensional InAs layer to three-dimensional QD structure during growth interruption was clearly observed by the gradual increase in 2.4 eV peak intensity, suggesting that the tailoring of QD evolution is possible.

[Reference]

[1] T.-W. Lee, G. Y. Seong, Y.-D. Kim, H. Hwang, S. Yoon, and E. Yoon, Jpn. J. Appl. Phys. **40**, L1-3 (2001)