

Energy band gap enhancement and coarsening kinetics of CdSe nanocrystals via Mn-doping

곽우철, 성윤모†, 이정철, 이명기, 김민석, 노경민

고려대학교

(ymsung@korea.ac.kr†)

CdSe and Mn:CdSe colloidal nanocrystals were prepared via the paraffin oil as a solvent and oleic acid as a capping regands. Their crystal structure, size and morphology were controlled varying these regands ratio, synthesis temperature and impurities atoms concentration. X-ray diffraction (XRD) patterns were used for determine the crystal structure as a well crystallized Zinc-Blend and calculate the particle size which show size increase as increasing doping concentration which considered impurity atoms affected important role for growth rate. Especially, ripening rate difference with different binding energy with selenium ions. As prepared nanocrystals were washed several times for removing remained source then dispersed in paraffin oil again to observe ripening rate with heating at 220, 230, 240 and 250 °C with different time period. The ripening rates and size distribution were monitored with UV-visible spectra which showed different growth rates depend on incorporated atoms and their concentration. High-resolution transmission electron microscopy (HRTEM) images show sphere shape and size distribution of each system.

Keywords: CdSe, Mn-doping, Kinetics, nanocrystals

Enhanced optical properties of noble metal-zinc oxide nanocomposites

이명기, 김기은, 곽우철, 노경민, 김민석, 김강일, 유민규, 성윤모†

고려대학교

(ymsung@korea.ac.kr†)

In this study spherical-shape Au- and Ag-ZnO nanocomposites were synthesized using a two-step solution phase method. The composite nanocrystals show enhanced UV light emission due not only to the surface electron transfer from the Au or Ag to the ZnO by the surface plasmon resonance (SPR), but to the extension of the Fermi energy level to the ZnO. Also, they show suppressed visible light luminescence due to the SPR energy transfer from the Au or Ag to the ZnO to excite the electrons trapped in oxygen vacancies.

In this study, Au- and Ag-ZnO composite nanocrystals with the size of 4~10 nm were successfully synthesized using wet chemical approaches. Enhanced photoluminescence (PL) properties were revealed in the composite nanocrystals, and the mechanism was discussed based upon the SPR and the energy band structure.

Keywords: ZnO, noble metal, PL, SPR