

Enhancement of Quantum Dots' Stability by Encapsulation of Silica Layer

김예원, 이도창[†]

KAIST

(dclee@kaist.ac.kr[†])

Encapsulation of homogeneous silica layer on the quantum dots' surface as a means to improve stability is discussed, and functionalization with a long-chain siloxane for dispersion in organic solvent is presented. Colloidal quantum dot is a highly-promising material for light-emitting devices due to its fluorescence property. However, the stability of quantum dots is not enough for commercial application. Encapsulation of silica layer can protect the quantum dots' surface and improve the stability by blocking the exposure of oxygen, while retaining their strong photoluminescence. Because the optical properties of the encapsulated quantum dots depend on the reaction condition, some factors are controlled to analyze how the reaction condition affects the quantum dots' surface. In addition, dispersion of particles in organic solvent and control of spacing between particles are necessary to incorporate them into other forms such as QD solids, QD films, QD inks for their application. Thus functionalization of hydrophilic particles with long-chain siloxane is used, and silica-coating with well-controlled interparticle spacing is investigated to contain quantum dots with high concentration.