

Synthesis of cd-free CIS/ZnS quantum dot with Mn doping for dual emission

방문형, 이강택^{1,†}

연세대학교; ¹연세대학교 화공생명공학과

(ktleee@yonsei.ac.kr[†])

Semiconductor quantum dots (QDs) have shown significant promise as light emitters, as solar cells, and in biological imaging. Most of the existing binary semiconductor QDs are made of highly toxic elements, i.e., Cd, Pb, and require surface modification to improve their emission efficiencies and stabilities. The syntheses and optical properties of ternary I-III-VI compounds, including CuInS₂(CIS) QDs, have recently been considered as replacements to conventional Cd-based QDs. We synthesized Mn-doped CuInS₂(CIS)/ZnS core/shell QDs, and both Mn²⁺ ions and CIS cores could emit simultaneously. The Mn-doped CIS QDs can give rise to largely tunable emission wavelengths from 530 nm to 605 nm. Their photoluminescence (PL) quantum yield(QY) can be greatly improved by over coating a wide band gap semiconductor such as ZnS on them.