

Structural and optical properties of upconversion CuInS/ZnS quantum dots

Magdy Ali, Jehan El Nady, Shaker Ebrahim and Moataz Soliman

Alexandria University, Egypt

A facile one-pot method to synthesis CuInS/ZnS (CIS/ZnS) QDs was developed. The prepared CIS/ZnS QDs exhibit bright emission. Moreover, the upconversion photoluminescence (PL) of the CIS/ZnS QDs was explored. Interestingly, extraordinary excitation-independent emission for both up and down conversion fluorescence of the CIS/ZnS QDs were observed. Analysis of X-ray diffraction (XRD) of CIS/ZnS QDs shows chalcopyrite crystal structure. The high-resolution transmission electron Microscopy (HRTEM) images demonstrated crystalline CIS/ZnS QDs in spherical shape with average diameter size of 2.5

nm and 3.6 nm for CIS and CIS/ZnS, respectively. The selected area electron diffraction (SAED) suggests that the prepared CIS/ZnS QDs are poly-crystalline with 0.32 nm lattice distance. The optical properties of CIS and CIS/ZnS QDs were evaluated. The PL peaks position are almost constant and exhibit a strong peak at about 640 nm for both up and down conversion emission with a linear relationship between the intensity of the PL emission peaks and various excitation wavelengths.

e: igsr.magdyali@alexu.edu.eg



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