

InP/ZnS Core-Shell and InP/ZnS/ZnS Core-Multishell Quantum Dots for Improved luminescence Efficiency

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Abstract : A promising alternative to traditional Quantum Dots QD materials, which contain toxic heavy elements such as lead and cadmium, sheds light on indium phosphide quantum dots (InP QDs) Owing to improve the quantum yields of photoluminescence and other properties. InP, InP/ZnS core/shell and InP/ZnS/ZnS core/shell/shell Quantum Dots (QDs) were synthesized by the hot injection method. The optical and structural properties of the core InP QDs, InP/ZnS QDs, and InP/ZnS/ZnS QDs have being considered by several techniques such as X-ray diffraction, transmission electron microscopy, optical spectroscopy, and photoluminescence. The average diameter of InP, InP/ZnS, and InP/ZnS/ZnS Quantum Dots (QDs) was varying between 10 nm, 5.4 nm, and 4.10 nm. This experience revealed that the surface morphology of the Quantum Dots has a more regular spherical form with color variation of the QDs in solution. The emission peak of colloidal InP Quantum Dots was around 530 nm, while in InP/ZnS, the emission peak is displayed and located at 598 nm. whilst for InP/ZnS/ZnS is placed at 610 nm. Furthermore, an enhanced PL emission due to a passivation effect in the ZnS-covered InP QDs was obtained. Add the XRD information FWHM of the principal peak of InP QDs was 63 nm, while for InP/ZnS was 41 nm and InP/ZnS/ZnS was 33 nm. The effect of the Zinc stearate precursor concentration on the optical, structural, surface chemical of InP and InP/ZnS and InP/ZnS/ZnS QDs will be discussed.

Keywords : indium phosphide, quantum dot, nanoparticle, core-shell, multishell, luminescence

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