

A Highly Efficient and Bright InP/ZnSe/ZnS Quantum Dots via High Temperature Synthesis for Display Applications

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InP-based quantum dots (QDs) have become alternative materials to heavy-metal-containing QDs and persistent effort has focused on the synthesis of InP-based QDs for improving optical properties. However, InP-based QDs still show poorer optical and morphological properties than cadmium-based QDs as CdSe-based QDs. Here, we report the highly efficient and bright red/green InP/ZnSe/ZnS QDs using high temperature synthesis of Zn-chalcogenide shell. High temperature synthesis derive diffusion-controlled reaction for spherical morphology of the QDs by the shell growth on the random facet. Spherical morphology means unidirectional carrier localization in core of the QDs, then increase of photoluminescence quantum yield (PL QY) and external quantum efficiency in light-emitting diodes. In this work, red and green InP/ZnSe/ZnS core/multi-shell QDs exhibit 82%, 73% of the maximum PL QY and excellent spherical morphology.