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Solution Phase Inorganic Ligand Exchange for Fabrication of Ink Based Quantum Dot Thin Films

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Abstract

PbS quantum dots are the main part of such cells which absorb the photons, turn it into electron-hole pairs and transferred them to the side electrodes. However, during the application of such structure in air atmosphere, QDs immediately destroyed due to their weak oxidation stability. Surface defects increases the density of nanoparticles surface damages and lead to charge carrier's recombination, which ultimately reduces the cell's performance. Photoluminescence measurements indicated that solution phase exchange of oleic acid to iodide based ligands improved air exposure oxidation of solid films. FTIR and XRD analyses also confirmed successful ligand exchange process and QDs stability in air. Subsequently, such prepared inks are used to fabricate quantum dot thin films.

Keywords: PbS quantum dot, Ligand exchange, Oxidation, Thin film.

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