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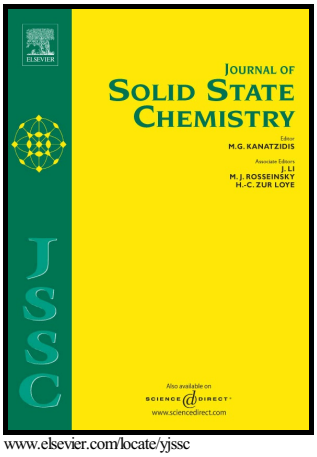

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Recent advances in plasmonic dye-sensitized solar cells

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Abstract

Dye-sensitized solar cells (DSSCs) are among the best devices in generating electrons from solar light energy due to their high efficiency, low-cost in processing and transparency in building integrated photovoltaics. There are several ways to improve their energy-conversion efficiency, such as increasing light harvesting and electron transport, of which plasmon and 3-dimensional nanostructures are greatly capable. We review recent advances in plasmonic effects which depend on optimizing sizes, shapes, alloy compositions and integration of metal nanoparticles. Different methods to integrate metal nanoparticles into 3-dimensional nanostructures are also discussed. This review presents a guideline for enhancing the energy-conversion efficiency of DSSCs by utilizing metal nanoparticles that are incorporated into 3-dimensional nanostructures.

Graphical abstract

Recent advances in plasmonic effects which depend on optimizing sizes, shapes, alloy compositions and integration of metal nanoparticles are discussed. Different methods to integrate metal nanoparticles into 3-dimensional nanostructures are also discussed. This review presents a guideline for enhancing the energy-conversion efficiency of DSSCs by utilizing metal nanoparticles that are incorporated into 3-dimensional nanostructures.

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