

The way forward for the modification of dye-sensitized solar cell towards better power conversion efficiency

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Abstract	<p>The power conversion efficiency (PCE) of TiO₂-based dye-sensitized solar cells (DSSCs) could be enhanced by modification of photoanodes. The effective blocking layer addition, one-dimensional nanostructure architecture, and scattering material design are the most important approaches to provide the high PCE of DSSCs and are critically reviewed in this work. The blocking layer generated the energy barrier can suppress the recombination of an electron in photoanode. One-dimensional (1D) nanostructures of a nanorod, nanotube and nanowire, promote the enhanced electron transport of DSSCs. The PCE of 1D nanostructure based DSSCs can potentially be improved by incorporating high surface area TiO₂ nanoparticles and constructing the multilayered 1D nanostructure arrays photoanodes. The scattering effect can be generated by mesoporous, core-shell and yolk shell materials with the sizes architecture corresponding to the wavelength of incident light, enhancing the light harvesting. The high efficiency of TiO₂-based photoanodes could be realized by optimizing the composition, size of materials, and thickness of photoanodes.</p>
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