

Spray Deposition of Titania Films with Incorporated Crystalline Nanoparticles for All-solid-state Dye-Sensitized Solar Cells Using P3HT

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Spray coating has received immense attention for the film deposition because it is simple, low cost, and usable for large-scale production. In the present work, this technique is employed to fabricate titania films for solid-state dye-sensitized solar cells (ssDSSCs) which use solid-state hole-transporting materials (HTM) for dye regeneration and hole transport. ssDSSCs, consisting of organic HTM and n-type inorganic nanocrystals, are of great interest due to the combined advantages of both organic and inorganic components. We investigate this kind of solar cells fabricated using mesoporous titania films as electron transporting materials, a metal-free dye D149 as a light harvester, and P3HT as HTM. For optimizing the device performance, we introduce crystalline titania nanoparticles into the titania film in order to obtain a more effective titania photoanode. The morphology and crystallinity of titania films are investigated, showing a crucial influence on final device performance.

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