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Author Guo-Yang Huang
Author's Email Address No Public.
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Abstract Abstract
The efficiency of dye-sensitized solar cells(DSSCs) has been investigated under different conditions. The optimal conditions were systematically studied by using the statistical experimental strategy. At the optimal conditions, a high efficient dye-sensitized solar cell has been assembled. Commercial TiO2 paste and sol-gel TiO2 paste derived from our preparation were used to make nanopourous TiO2 electrode, and the platinum counter-electrodes were prepared using the sputtering method and the spin-coating methods, respectively. The liquid electrolyte, 0.1M I2、0.5M 4-tert-Butylpyridine(TBP)、0.1M LiI and 3-methoxypropionitrile(MPN) or acetonitrile(ACN) , was used in the photovoltaic devices. Furthermore, the higher photovoltaic conversion efficiency was obtained by using the spin-coating method to make Pt counter-electrode in the device. In order to increase the efficiency of the dye-sensitized solar cell, we used acetonitrile(ACN) as the solvent to make up liquid electrolyte and get the higher photovoltaic conversion efficiency to 4.2% on the 30Ω FTO substrate.
When we changed the FTO glass as substrate , a higher efficiency of 6.2% device was obtained under same other conditions . Finally , we used the statistical experimental strategies to generalize the best conditions for the component of dye-sensitized solar cell in order to obtain the higher photovoltaic conversion efficiency. The optimal conditions as follows: 10Ω FTO substrate , 8μm TiO2 film thickness , ACN as solvent for electrolyte , 15% PEG content in TiO2 paste and spin-coated Pt counter-electrode . The highest efficiency is about 6.6% .
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