

Various size Janus novel morphology TiO₂ nanoparticle via sol-gel process for Dye-sensitized Solar cell's photoelectrode

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Improvement of the dye loading that could be correlated with an increase in the surface area of the layer and enhanced Jsc performance in dye-sensitized solar cell's. Also shifts the conduction band edge of TiO₂ photoelectrode toward a negative potential value enhanced Voc performance in dye-sensitized solar cell's. Beside, to better penetration of electrolyte, it is essential to use the mesoporous or macroporous TiO₂ photoelectrode structure than microporous TiO₂ photoelectrode structure. For this reason, TiO₂ nanoparticles size, morphology and structure in dye-sensitized solar cell's photoelectrode are a very important factor for the solar energy conversion efficiency. That's why enhanced photovoltaic performance of dye-sensitized solar cell's were achieved by modifying the TiO₂ for photoelectrode with ATRP process with polymer POEM and sol-gel process with TTIP. Finally, DSSCs with various size Janus novel morphology TiO₂ (TiO₂-POEM/TTIP) in photoelectrode showed the best photovoltaic performance with inorganic/organic electrolyte (Jsc) of 7.27mA/cm², (Voc) of 0.771V, (FF) of 0.59 and the (η) of 3.33% under illumination of 100mW/cm², respectively)