

Fabrication of Dye-sensitized Solar Cells using Polycarbonate Membranes Templated TiO₂ Nanowires/Nanotubes

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Different diameter TiO₂ Nanowires/Nanotubes (TNW/TNT) are fabricated by soft template-based synthesis technique. Track-etched polycarbonate (PC) was used as template to synthesize TNW/TNT films which used as interfacial layer to improve the efficiency of dye-sensitized solar cell (DSSC). Upon calcination at 500°C, TiO₂ nanowires (15TNW) were obtained from PC with a 15 nm pore diameter, whereas TiO₂ nanotubes (50TNT and 100TNT) were generated from PC with 50 and 100 nm diameter pores, respectively. TNW and TNT were used as photoelectrodes in DSSCs employing a polymer electrolyte. These TNW and TNT films were further coated with the graft copolymer-directed mesoporous TiO₂ and were used as interfacial layers between the FTO glass and the 4- μ m-thick nanocrystalline TiO₂ film. The DSSC performance was systematically investigated in terms of interfacial resistance and charge recombination using electrochemical impedance spectroscopy.