

## **Preparation of TiO<sub>2</sub> compact layer by heat treatment of electrospun TiO<sub>2</sub> composite for dye-sensitized solar cells**

### **ABSTRACT**

The power conversion efficiency (PCE) of the dye-sensitized solar cell was improved by using titanium dioxide (TiO<sub>2</sub>) compact layer prepared via heat treatment assisted electrospinning. Titanium tetraisopropoxide mixed with polyvinyl-alcohol was used as the electrospun solution. In this study, TiO<sub>2</sub> photoanode with TiO<sub>2</sub> compact layer was compared with TiO<sub>2</sub> photoanode without TiO<sub>2</sub> compact layer where the PCE was improved by 76.88%. Electrochemical impedance spectroscopy proved that the TiO<sub>2</sub> compact layer can reduce the series resistance and improved the short circuit current density, resulting in a low recombination effect that leads to a higher PCE. The electron lifetime and charge collection efficiency of TiO<sub>2</sub> nanoparticles with TiO<sub>2</sub> compact layer displayed a higher value compared to TiO<sub>2</sub> nanoparticles without TiO<sub>2</sub> compact layer.

**Keyword:** Dye-sensitized solar cell; Compact layer; Titanium isopropoxide; Polyvinyl alcohol; Electrospinning