

## **Back-illuminated dye sensitized solar cell flexible photoanode on titanium foil**

### **ABSTRACT**

This paper reports the preparation and performance analysis on dye-sensitized solar cells (DSSC) using titanium (Ti) foil as flexible photoanode for back-illuminated measurement. Performance differences were also carried with the fluorine-doped tin oxide (FTO) glass photoanode using the back and front-illuminated technique. The hydrogen peroxide (H<sub>2</sub>O<sub>2</sub>) treated Ti foil surface was applied and the doctor blade method was used for deposition on photoanode during the process of fabrication. Surface morphology of the treated Ti Foil with H<sub>2</sub>O<sub>2</sub> shows the formation of TiO<sub>2</sub> nanostructure which results in significant attachment of TiO<sub>2</sub> layer on Ti Foil. The results on measurement show that the fabricated flexible photoanode DSSC has an efficiency of power conversion at 1.00% under 1.5 A.M solar radiation by using back-illuminated while DSSC with solid state glass photoanode has an efficiency power conversion at 0.53% (back-illuminated) and 2.22% (front-illuminated). However, the flexible photoanode DSSC has better power conversion efficiency than the solid-state glass photoanode DSSC under the condition of back-illumination. It is lower in result comparatively with front illumination DSSC due to the coated of platinum at the counter electrode that reflects light partially, while electrolyte iodine absorbs some photons and effects on DSSC performance.

**Keyword:** DSSC; Solar cell; Ti foil; Back-illumination; Flexible photoanode