

## Titanium dioxide-reduced graphene oxide thin film for photoelectrochemical water splitting

### ABSTRACT

The incorporation of reduced graphene oxide (rGO) on a TiO<sub>2</sub> surface had been demonstrated to be an effective method to enhance the photoelectrochemical performance. A TiO<sub>2</sub>/rGO thin film was fabricated by depositing TiO<sub>2</sub> on ITO using an aerosol-assisted chemical vapor deposition method and GO dip-coating, followed by thermal reduction of the GO layer. The fabricated thin film was characterized using XRD and FESEM techniques. The photoelectrochemical performance of the TiO<sub>2</sub>/rGO thin film was investigated under the illumination of simulated solar light. The TiO<sub>2</sub>/rGO showed a higher photocurrent response (80.2  $\mu$ A) than bare TiO<sub>2</sub> (13.1  $\mu$ A). This improved photoelectrochemical performance was due to the rGO, which increased the electron transport and thereby minimized the charge recombination process. The TiO<sub>2</sub>/rGO thin film showed good stability, even after being subjected to 1000 voltammetric cycles, and the rGO sheets remained adhered to the surface of the TiO<sub>2</sub> thin film.

**Keyword:** Graphene; Photoelectrochemistry; Titanium oxide; Thin film; Water splitting