

## **Preparation of polypropylene filter incorporated with titanium dioxide and reduced graphene oxide for real water treatment**

### **ABSTRACT**

Herein, we report the hydrothermal preparation of a reduced graphene oxide/titanium dioxide incorporated porous polypropylene (PP-RGO/TiO<sub>2</sub>) filter for water treatment application. The as-prepared PP-RGO/TiO<sub>2</sub> filter was characterized by Raman and Field Emission Scanning Electron Microscopy (FESEM) analyses. The Raman spectra suggested the successful reduction of GO to RGO and the incorporation of TiO<sub>2</sub> into the RGO sheets. The photocatalytic activity of the PP-RGO/TiO<sub>2</sub> filter was investigated in relation to the degradation of methylene blue (MB), and it showed complete degradation of MB after illumination by a halogen lamp for 2 h. Further, this PP-RGO/TiO<sub>2</sub> filter was used for the treatment of real lake water. The dissolved oxygen (DO) of the lake water after being treated with the PP-RGO/TiO<sub>2</sub> filter in the presence of ultraviolet (UV) irradiation showed great reductions of 7.5, 14, and 24% for the first, second, and third cycles, respectively. The chemical oxygen demand (COD) of the lake water was effectively decreased to 43, 27, and 16% in successive cycles by the PP-RGO/TiO<sub>2</sub> filter with the assistance of UV. Moreover, a good reduction in the NH<sub>3</sub>-N concentration was also shown in lake water when it was treated under the same condition as the DO, with an increase in the ammonia removal of >27%. The PP-RGO/TiO<sub>2</sub> filter maintained its ability to remediate wastewater even after three cycles of treatment.

**Keyword:** Ammonia-nitrogen; Chemical oxygen demand; Dissolved oxygen; Graphene; Titanium dioxide; Water treatment