

## **Preparation and characterization of graphene oxide from tea waste and it's photocatalytic application of TiO<sub>2</sub>/graphene nanocomposite**

### **ABSTRACT**

In the present study, the conversion of tea waste biomass was carried via carbonization at high temperature and further used as starting material to produce graphene oxide (GO). The oxidation and exfoliation of graphitized carbon was successfully achieved using modified Hummer's method. The as synthesized GO have been loaded with titanium dioxide (TiO<sub>2</sub>) using hydrothermal method to produce nanocomposite of rGO/TiO<sub>2</sub>. The prepared nanocomposites were characterized by means of XRD, FTIR, Raman and FESEM analysis. The evaluation for rGO/TiO<sub>2</sub> nanocomposite photocatalytic activity was carried out based on degradation of methyl orange (MO) under the ultraviolet (UV) light irradiation. Results obtained using FTIR results revealed the successful oxidation of graphitized carbon with the presence of carboxyl and hydroxyl group. FESEM images suggested the changes of surface morphology from graphite flakes structure into few layers of graphene sheets. Therefore, it can be indicated that tea waste suitable to be sustainable alternative of graphite for the synthesis of GO. Moreover, GO obtained has immense potential for degradation of various water pollutions. Photocatalytic activity experiment inferred that the importance of optimum ratio between reduce GO to TiO<sub>2</sub> materials which can resulted in difference in the degradation efficiency; rGO/TiO<sub>2</sub> 1:8 > rGO/TiO<sub>2</sub> 1:4 > TiO<sub>2</sub> > rGO/TiO<sub>2</sub> 1:6 > rGO/TiO<sub>2</sub> 1:10.