

Preliminary studies of the impact of synthesis method on Reduced Graphene Oxide-Titanium Composite

ABSTRACT

There are two current major challenges aroused by the continued usage of fossil fuels as the energy source, which are the production of high levels of carbon dioxide (CO₂), resulting in global warming, and concerning the use of energy resources. There is a clear need to explore new prospects for CO₂ capture to prevent it from penetrating into the atmosphere. Carbon Capture and Conversion (CCC) method is one of the alternative solutions in carbon management. The synthesized reduced graphene oxide-Titanium (rGO-TiO₂) composites used in this preliminary study is the CCC material which will potentially capture the carbon dioxide (CO₂) and convert it into a hydrocarbon fuel such as methane. The aim of this preliminary study is to examine the impact of synthesis method and raw material to synthesize the rGO-TiO₂ composite. The photocatalytic activity was measured by using the Gas Chromatograph (GC) while the optical properties were measured by using Electrochemical Impedance Spectroscopy (EIS) and fluorescent spectrometer (PL). The EIS, PL and GC results confirms that the synthesize method and raw materials were affect the optical properties and the photocatalytic performance of the rGO-TiO₂. The rGO-TiO₂(H1) which was synthesized using the TBT powder via Hydrothermal method shows the best electrical properties and lowest recombination rate of the photogenerated electron-hole pairs compared to the other samples. The rGO-TiO₂(H1) also shows the highest photoreduction performance with 0.722 μmol/gcat methane yield.