Synthesis of 3D Graphene Based Composites for Biosensor and Energy Materials

Hee Dong Jang†, Sun Kyung Kim, Hankwon Chang
Korea Institute of Geoscience and Mineral Resources
(hdjang@kigam.re.kr†)

We synthesized GR based nanocomposites such as TiO_2/GR and Pt/GR for glucose biosensor and electrocatalyst respectively. The nanocomposites were fabricated from a colloidal mixture of TiO_2 nanparticles or aqueous chloroplatinic acid (H_2PtCl_6) and graphene oxide(GO) sheets via an aerosol spray pyrolysis. The effect of the precursors content in the colloidal mixture on the composite property, including the morphology, crystal structure and specific surface area was investigated. The particle morphology of TiO_2/GR composites was spherical in shape and micron-sized TiO_2 particles were encapsulated by GR nanosheets. The glucose biosensor fabricated by TiO_2/GR composite showed higher catalytic performance for glucose redox than a pure TiO_2 and GR biosensor. The morphology of Pt/GR was the shape of a crumpled sheet of paper and the average size of the composite was around 1.3μm in diameter. As Pt content increased from 2 to 20wt% higher numbers of Pt nanoparticles are observed on the GR at higher Pt content and the specific surface area of the composite also increased from 122 to 146m^2/g. The glucose biosensor fabricated by Pt/GR composite showed higher performance on methanol oxidation than a commercial Pt/carbon black elctrocatalyst.