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Extended Abstract
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Chemistry congress: 2019-New tendency of modified graphene with different methods for the photo catalytic applications - Won-Chun Oh

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Due to its unique atom-thick 2D structure and remarkable physicochemical properties, graphene has been sparked a flurry of research into its optical, electronic, thermal, and mechanical properties. In particular, a great deal of recent attention has been attracted to explore graphene and graphene composites for photoelectrochemical applications. Recently, much works have been done on attempting to design and prepare novel graphene-based materials for a wide range of applications in photo-electrochemistry, ranging from photoelectrochemical solar cells, photocatalytic decomposition of organic pollutants, and H2 evolution. In this feature article, we summarize the state of research on graphene-based materials for photo-electrochemistry. The prospects and further developments in this exciting field of graphenebased materials are also discussed.

Graphene—a one-atom-thick planar sheet of carbon atoms arranged during a honeycomb crystal lattice—continues to make one among the foremost active areas of condensed matter research. Its properties, including high mechanical stiffness and strength (when defect free, thus so far only over small distances like microns), including high electrical and thermal conductivity, make graphene an exciting prospect for a number of future applications in nanoelectronics, thermal management and energy storage devices. One key to optimizing this potential is that the ability to tune the properties of graphene through chemical functionalization. The aim of this focus issue of latest Journal of Physics is to supply a snapshot of a number of the newest state-of-the-art techniques now getting used to control and treat the fabric .

Graphene oxide was prepared from natural crystalline graphite powder by Hummers method. Thus, 2 g of graphite powder, 1 g of NaNO3, and 46 ml of concentrated H2SO4 were mixed together during a flask placed into an ice bath and stirred for 30 min. Then, 6 mg of KMnO4 was added into the mixture by portions to stop the temperature rise above 20 °C and stirred for two h. Subsequently, the temperature of suspension was delivered to 35 °C and maintained at this level for an hour. Then, 92 ml of water was added at ambient temperature into the brownish gray paste, causing violent effervescence and a rise of temperature to 98 °C. The obtained diluted, brown color suspension was kept at this temperature for several minutes; during this point , the answer changed its color to bright yellow; and after this, the suspension was further diluted with 250 ml of warm water and treated with 20 ml of H2O2 to scale back the residual permanganate and manganese dioxide. While the suspension was still warm, it had been vacuum filtered to avoid precipitation of side products. The filter cake was washed with warm water and centrifuged on a Sigma 6-16 K centrifuge (SciQuip, USA). The obtained sediment was freeze-dried on a Gamma 1-16 LSC plus machine (Martin Christ Gefriertrocknungsanlagen GmbH).

In chemistry, photocatalysis is that the acceleration of a photoreaction within the presence of a catalyst. In catalysed photolysis, light is absorbed by an adsorbed substrate. In photogenerated catalysis, the photocatalytic activity (PCA) depends on the power of the catalyst to make electron–hole pairs, which generate free radicals (e.g. hydroxyl radicals: •OH) ready to undergo secondary reactions. Its application was made possible by the invention of water electrolysis by means of titanium oxide (TiO2).

Research in photocatalysis subsided for over 25 years thanks to lack of interest and absence of practical applications. However, in 1964, V.N. Filimonov investigated isopropanol photooxidation from ZnO and TiO2; at round the same time, Kato and Mashio, Doerffler and Hauffe, and Ikekawa et al. (1965) explored oxidation/photooxidation of CO2 and organic solvents from ZnO radiance. a couple of years later, in 1970, Formenti et al. and Tanaka and Blyholde observed the oxidation of varied alkenes and therefore the photocatalytic decay of laughing gas (N2O), respectively.

This work is partly on 24th 2nd Edition of Euros icon Conference on Chemistry on July 18-19, 2019 held at Prague, Czech Republic

Conversion of water to hydrogen gas by photo catalytic water splitting. An efficient photo catalyst within the UV range is predicated on a sodium tantalite (NaTaO3) doped with La and loaded with a co catalyst nickel oxide. The surface of the sodium tantalite crystals is grooved with so called nanosteps that's a results of doping with lanthanum (3–15 nm range, see nanotechnology). The NiO particles which facilitate hydrogen gas evolution are present on the sides , with the oxygen gas evolving from the grooves. Use of titanium oxide in self-cleaning glass. Free radicals generated from TiO2 oxidize organic matter. Disinfection of water by supported titanium oxide photocatalysts, a sort of solar water disinfection (SODIS). Use of titanium oxide in self-sterilizing photocatalytic coatings (for application to food contact surfaces and in other environments where microbial pathogens spread by indirect contact). Oxidation of organic contaminants using magnetic particles that are coated with titanium oxide nanoparticles and agitated employing a magnetic flux while being exposed to UV light. Conversion of CO2 into gaseous hydrocarbons using titanium oxide within the presence of water. As an efficient absorber within the UV range, titanium oxide nanoparticles within the anatase and rutile phases are ready to generate excitons by promoting electrons across the band gap. The electrons and holes react with the encompassing water vapour to supply hydroxyl radicals and protons. at the present , proposed reaction mechanisms usually suggest the creation of a highly reactive carbon radical from carbon monoxide gas and CO2 which then reacts with the photo generated protons to ultimately form methane. Although the efficiencies of present titanium oxide based photo catalysts are low, the incorporation of carbon based nanostructures like carbon nanotubes and metallic nanoparticle are shown to reinforce the efficiency of those photocatalysts. Sterilization of surgical instruments and removal of unwanted fingerprints from sensitive electrical and optical components

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