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Investigation of Ag- GO- TiO₂ Cocatalyst Composites for Photocatalysis Application

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A non- toxic semiconductor catalyst such as titanium dioxide (TiO₂) has been developed and modified as a smart catalyst in terms of electron transfer and self-regeneration. In this work, we modified TiO₂ with graphene oxide (GO) and metal nanoparticles such as silver (Ag) to enhance photocatalytic property of TiO₂ powder. The result showed that Ag- GO- TiO₂ composites exhibited better photocatalytic property in Rhodamine B degradation from 65% to 85% than pure TiO₂ powder. X- ray absorption spectroscopy (XAS) was used to investigate metal species at the surface of the cocatalyst composites. The Ag nanoparticles were formed at the surface and, hence, would enhance electron transfer in the photocatalysis reactions. An improved photocatalytic activity was obtained. During the photocatalysis reaction under illumination, GO can be reduced to reduced graphene oxide being electron acceptors and, hence, reducing electron- hole recombination at the TiO₂ surface in photocatalysis reaction. This cocatalyst composite is very interesting for further study such as in photoelectrochemical (PEC) process. Understanding electrochemical mechanism of the cocatalyst composite is required to improve and modify cocatalyst to use in water purification to reduce cost in catalyst powder separation after water treatment process.