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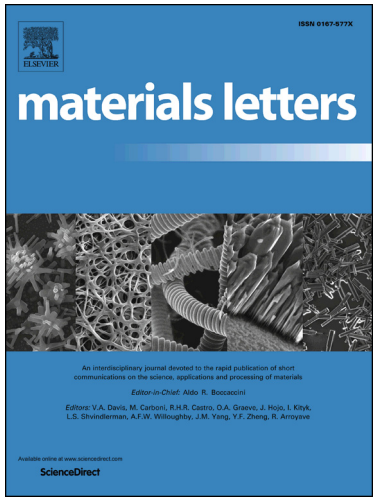

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Duangdao Channei, Auppatham Nakaruk, Sukon Phanichphant

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Influence of Graphene Oxide on Photocatalytic Enhancement of Cerium Dioxide

Duangdao Channei[a], Auppatham Nakaruk[b,c], Sukon Phanichphant[d]*

[a] Department of Chemistry, Faculty of Science, Naresuan University, Phitsanulok 65000, Thailand

[b] Department of Industrial Engineering, Faculty of Engineering, Naresuan University, Phitsanulok 65000, Thailand

[c] Centre of Excellence for Innovation and Technology for Water Treatment, Naresuan University, Phitsanulok 65000, Thailand

*[d] Materials Science Research Center, Faculty of Science, Chiang Mai University, Chiang Mai 50200, Thailand

*E-mail: sphanichphant@yahoo.com (Corresponding author)

Abstract Graphene oxide (GO) was prepared by oxidizing purified natural flake graphite via modified Hummers method. The suspension of GO particles and cerium-based precursors were treated hydrothermally in order to prepare CeO_2/GO composites. The disappearance of the [001] GO diffraction peak was observable in the XRD pattern for CeO_2/GO composites because the crystal growth of CeO_2 between the interlayer of GO destroyed the regular layer stacking of GO phase. However XPS spectra of O 1s core level and oxygen vacancies defect in CeO_2 caused the decrease in degree of crystallinity. Composite of CeO_2 with GO not only prevented the formation of extrinsic vacancies in the oxygen sub-lattice, but also prevented the switching from the major photoactive species Ce^{4+} to Ce^{3+}.The photocatalytic activity measurements demonstrated that the CeO_2/GO composites exhibited much higher photocatalytic activity than CeO_2 for degradation of methylene blue (MB) under visible light irradiation. The enhancement of photocatalytic activity could be attributed to the excellently elevated absorption ability for the MB dye through π–π conjugation. As reported in PL results, the effective inhibition of the recombination of photogenerated electron–hole pairs due to the charge interaction between CeO_2 and GO.

Keywords: Composite materials, Photocatalysis, Graphene oxide, Cerium dioxide

1. Introduction

Recently, advanced oxidation processes (AOP) have received much attention as alternative methods for organic contaminant degradation. The oxidation processes based on the use of hydroxyl radical ($OH^{\cdot}$) are known as one of the most powerful oxidizing species that can react