Proceedings International
Platinum Open Access Journal (ISSN 2668-6384)

Proceedings, Abstract
Volume 2, Issue 2, 2020, 47
https://doi.org/10.33263/Proceedings22.047047

Photocatalytic CO_2 Reduction and Thermal Properties of Alumina/Silica Coated TiO_2 Nanoparticles †

Yuksel Akinay [1,*], Ihsan Nuri Akkus [1]

[1] Engineering Faculty, Department of Mining Engineering, Van Yuzuncu Yil University, Turkey
* Correspondence: yukselakinay@yyu.edu.tr;
† Presented at Materials Chemistry and Physics (Materials Chemistry 2020) - International e-Conference
Received: 16.09.2020; Revised: 20.09.2020; Accepted: 24.09.2020; Published: 27.09.2020

Abstract: In this study, the surface of TiO_2 was coated with SiO_2 and Al_2O_3 layers by sol-gel and chemical deposition methods. Firstly, the $TiCl_4$ was magnetically stirred for 1 h in deionized water, and then the NaOH solution was drop wised to the solution and stirred 2h. Finally, the obtained TiO2 was washed, filtered, and dried in a vacuum oven. The surface of TiO_2 was coated with SiO_2 and Al_2O_3 layers subsequently by chemical deposition methods. The morphological, thermal, and crystal properties of products were determined via SEM, TGA, and XRD machines. The X-ray diffraction peaks displayed that the TiO_2 nanoparticles were synthesized without any extra peaks. Moreover, the SiO_2 and Al_2O_3 coated TiO_2 particles contain extra SiO_2 and Al_2O_3 peaks, indicating that the surface of TiO_2 was coated via SiO_2 and Al_2O_3. The SEM results displayed that TiO_2 and SiO_2 and Al_2O_3 coated TiO_2 were spherical in shape, and the size distribution was found to be around 20-50 nm and 200-300 nm, respectively. The photocatalytic and UV–vis analyses were used to determine the CO_2 reduction and optical properties of particles. The results showed that the absorption peaks were broad to longer wavelength with a coating of SiO_2 and Al_2O_3. The CO_2 reduction performance of TiO_2 has been enhanced via coating SiO_2 and Al_2O_3 layer.

Keywords: photocatalytic; alumina; silica; TiO_2 nanoparticle.

Funding

This study was supported by Van YYU University Scientific Research Projects Coordination Unit. Project Number: FBA-2019-7959.

Acknowledgments

All characterization was carried out at the Science and Application Centre of VAN YYU.

Conflicts of Interest

The authors declare no conflict of interest.