

2nd Latin-American Congress of Photocatalysis
Guadalajara, Jalisco, México.
September 24-27

Jun 03th, 2013.

Dear : **Guzman-Velderrain**

I am pleased to inform you that your contribution Temperature Effect Study on the Photocatalytic Activity of TiO₂ Films Deposited on Polypropylene towards Propane Degradation, by the authors V. Guzmán-Velderrain, Y. Ortega-López, A. López-Ortiz, J. Salinas-Gutiérrez, V. Collins-Martínez, has been accepted for to be presented in the 2nd Latin-American Congress of Photocatalysis, as O-06, to be held in Guadalajara, Jalisco, México from September 24-27, 2013.

Your contribution should be presented in the **oral** modality.

Sincerely yours,

Alejandro Pérez Larios, PhD

Vicente Rodriguez Gonzalez, Ph. D

Chairmen, LACP 2013

Temperature Effect Study on the Photocatalytic Activity of TiO₂ Films Deposited on Polypropylene towards Propane Degradation

V. Guzmán-Velderrain, Y. Ortega-López, A. López-Ortiz, J. Salinas-Gutiérrez, V. Collins-Martínez*

*Centro de Investigación en Materiales Avanzados S. C., Laboratorio Nacional de Nanotecnología, Depto. de Materiales Nanoestructurados, Miguel de Cervantes 120, C. P. 31109, Chihuahua, Chih. México. Tel: +52 (614)439 11 29 * e mail: virginia.collins@cimav.edu.mx*

Introduction: Photocatalysis is a promising process for the purification of air [1], which is activated by photons and not with temperature. However, the latter effect is important on the adsorption and desorption of reactant molecules on the surface of the semiconductor (photocatalyst) [2]. The objective of this work is to synthesize and characterize TiO₂ coatings on polypropylene (PP), in addition to evaluating its photocatalytic activity towards the degradation of propane at temperatures of 10 and 35°C.

Experimental: A coating was synthesized by the Sol-Gel/Hydrothermal technique by mixing isopropanol, distilled water and titanium isopropoxide in a 1.5/1.5/150 molar ratio, respectively. Nitric and acetic acids were used to adjust the pH between 1-2. Characterization was performed using XRD, TGA, SEM, UV-Vis spectroscopy and BET-area techniques. Also, the coating was subjected to adherence and adsorption capacity (gravimetric) tests. The photocatalytic activity was evaluated in a batch type reactor of PP coated on the inside with a TiO₂ film and illuminated using an 8W black light irradiation lamp at temperatures of 35 and 10°C. Reaction products were followed by gas chromatography (CG).

Results and Discussion: The crystal structure present in the TiO₂ coating was the anatase phase and this is attributed to the complex compounds that acetic acid generates when reacting with titanium isopropoxide [3]. The morphology of the coating was homogeneous with minimal defects (fractures) and its band gap value was 3.25eV, which agrees with that reported for the anatase phase (3.2eV) [4]. The synthesized coating has a surface area of 215 g/m². Figure 1 presents the photocatalytic evaluation of the coating and TiO₂-P25 at 35° and 10°C. This figure shows the temperature effect on the photocatalytic activity of the materials, where lower temperatures cause lower activities. This behavior is explained with results of water adsorption-desorption of the materials, where at 10°C the adsorption capacity increases, but desorption rate decreases, with the latter affecting the overall photocatalytic process. By comparison,

P25-TiO₂ presents a higher propane degradation rate, however, its adhesion properties to the substrate are very poor and the generated film is not continuous, which over time tends to decrease its activity, and this is not the case with the synthesized coating [5].

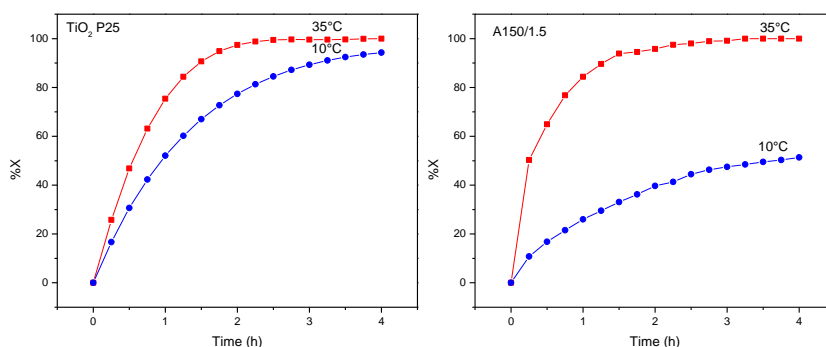


Figure 1.- Propane conversion towards CO₂ at 35°C (a) and 10°C (b).

References

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TO WHOM IT MAY CONCERN
Present

This is to certify that **V. Guzmán-Velderrain, Y. Ortega-López, A. López-Ortiz,
J. Salinas-Gutiérrez, V. Collins-Martínez**

Presented the contribution: **Temperature Effect Study on the Photocatalytic Activity of TiO₂
Films Deposited on Polypropylene towards Propane Degradation** In the 2nd. Latin-American Congress of
Photocatalysis (LACP 2013) held in Guadalajara, Mexico from September 24th to 27th, 2013.

PHOTOCATALYSIS

Sincerely



Alejandro Pérez Larios
Chairman