NPM-4

The 4th International Conference on

New Photocatalytic Materials for Environment, Energy and Sustainability

PAOT-5

The 5th International Conference on

Photocatalytic and Advanced Oxidation Technologies for the Treatment of Water, Air, Soil and Surfaces

ABSTRACTS

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Antwerp University, Antwerp, Belgium
April 23–25, 2019

WEDNESDAY, APRIL 24, 2019

SESSION V: VISIBLE LIGHT PHOTOCATALYSTS

8:30 – 8:55
IL

BiOX – The Visible Light Photocatalyst

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8:55 – 9:20
IL

Solar Heterogeneous Photocatalysis for High Added Value Molecules Production

Marianna Bellardita, Vittorio Loddo, Elisa García López, Giuseppe Marcì and Leonardo Palmisano

Dipartimento di Energia- Viale delle Scienze Edificio, Palermo, Italy

9:20 – 9:40
ST

Photocatalytic Degradation of Veterinary Drug Compounds via Porous Organic Polymers using Visible Light

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Solar Heterogeneous Photocatalysis For High Added Value Molecules Production

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Heterogeneous photocatalysis is a technology widely applied to the unselective degradation/mineralization of organic pollutants present both in liquid and gaseous effluents. However, its effectiveness to selectively oxidize and reduce substrates producing higher value chemicals has been recently proved, demonstrating its applicability as a green alternative to industrial catalytic oxidation reactions [1]. Important reactions from the industrial point of view are the selective oxidation of aromatic alcohols to the corresponding aldehydes, the conversion of biomass, the CO_2 reduction and the H_2 production. Aldehydes are used in sweet blossom and flavour compositions for confectioneries and beverages and, furthermore, they are intermediates in many different industrial processes. Saccharides deriving from lignocellulose hydrolysis are one of the most abundant biomass-derived platform molecules and their oxidation can give rise to many valuable products. The selective glucose oxidation to gluconic, formic, levulinic and lactic acids and to arabinose and erythrose is particularly attractive because they are platform chemicals industrially employed [2]. The oxidation of six-carbons sugars (glucose or fructose) yields 5-hydroxymethyl-2-furfural (HMF), which can be furtherly converted to 2,5-furandicarboxaldehyde (FDC) and 2,5-furandicarboxylic acid (FDCA), the precursors for biopolymers fabrication [3,4]. TiO_2 is the most employed photocatalyst because of its low cost, chemical and photochemical stabilities, and ease of preparation but its photoactivation presents some weaknesses due to its high electron/hole recombination rate and the need of UV light. Many approaches have been explored to improve the TiO_2 efficiency and to better exploit the solar radiation, as doping with metal and non-metal species [5], surface modification by organic species sensitization, coupling of different semiconductors, use of alternative photocatalysts with smaller band gap values and lower recombination rate of the photogenerated charges [6,7].

In this contribution are presented some results related to the solar light photocatalytic production of high value added chemicals by partial oxidation and reduction reactions.

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[4] Y. Kanetaka, S. Yamazaki, K. Kimura, Macromolecules 49 (2016) 1252-1258.

[5] M. Bellardita, E. García-López, G. Marcì, G. Nasillo, L. Palmisano, Europ. J. Inorg. Chem. (2018) 4522-4532.

[6] M. Bellardita, E.I. García-López, G. Marcì, I. Krivtsov, J.R. García, L. Palmisano, Appl. Catal. B 220 (2018) 222–233.

[7] B. Di Credico, M. Redaelli, M. Bellardita, M. Calamante, C. Cepek, E. Cobani, M. D'Arienzo, C. Evangelisti, M. Marelli, M. Moret, L. Palmisano, R. Scotti, Catalysts 8 (2018) 353.