

7<sup>th</sup> World Congress and Expo on **Green Energy**

&

3<sup>rd</sup> World Congress on **Wind & Renewable Energy**

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**Photoassisted methanation using Cu<sub>2</sub>O nanoparticles supported on graphene as photocatalyst**

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Photoassisted CO<sub>2</sub> methanation can be carried out efficiently at 250°C using Cu<sub>2</sub>O nanoparticles supported on few layer graphene (Cu<sub>2</sub>O/G) as photocatalyst. The Cu<sub>2</sub>O/G photocatalyst has been prepared by chemical reduction of a Cu salt (Cu(NO<sub>3</sub>)<sub>2</sub>) with ethylene glycol in the presence of defective graphene obtained from the pyrolysis of alginate acid at 900 °C under Ar flow. Using this photocatalyst a maximum specific CH<sub>4</sub> formation rate of 14.93 mmol/gCu<sub>2</sub>O•h and apparent quantum yield of 7.84 % was achieved, which is one of the highest reported values for the gas-phase methanation reaction at temperatures below Sabatier reaction (>350°C). It was found that the most probable reaction mechanism involves photoinduced electron transfer from the Cu<sub>2</sub>O/G photocatalyst to CO<sub>2</sub>, while evidence indicates that light-induced local temperature increase and H<sub>2</sub> activation are negligible. The role of the temperature in the process has been studied, the available data suggesting that heating is needed to desorb the H<sub>2</sub>O formed as product during the methanation. The most probable reaction mechanism seems to follow dissociative pathway involving detachment of oxygen atoms from CO<sub>2</sub>.



**Recent Publications:**

1. Harper C (2009) The neuropathology of alcohol-related brain damage. Alcohol 44(2):136-140.
2. Li X, Schwacha M G, Chaudry I H and Choudhry M A (2008) Acute alcohol intoxication potentiates neutrophil-mediated intestinal tissue damage after burn injury. Shock 29(3):377-383
3. Sullivan E V and Zahr N M (2008) Neuroinflammation as a neurotoxic mechanism in alcoholism: Commentary on "Increased MCP- 1 and microglia in various regions of human alcoholic brain". Experimental neurology 213(1):10-17.
4. Heilig M and Egli M (2006) Pharmacological treatment of alcohol dependence: Target symptoms and target mechanisms. Pharmacology and therapeutics 111(3):855-876.
5. Room R, Babor T and Rehm J (2005) Alcohol and public health. Lancet 365(9458):519-530.

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### **Biography**

Josep Albero has obtained his Chemical Engineering degree at the Jaume I University of Castellon, Spain in 2005; MSc degree at Rovira I Virgili University in 2009. He has worked in the synthesis and characterization of nanocrystalline semiconductor quantum dots for photovoltaic applications when received his PhD in the group of E. Palomares at ICIQ. After that, he joined H Garcia group in ITQ as Postdoctoral Fellow. His research interest is the charge transfer reactions in nanostructured materials and their applications in renewable energies.

### **Notes:**