

## Ordered mesoporous WO<sub>3</sub> photocatalyst for the selective oxidation of methane to methanol

Katherine Villa<sup>1\*</sup>, Sebastián Murcia-López<sup>1</sup>, Teresa Andreu<sup>1</sup> and Joan R. Morante<sup>1,2</sup>

 <sup>1</sup> Catalonia Institute for Energy Research (IREC), Jardins de les Dones de Negre 1, 08930 Sant Adrià de Besòs, Spain
<sup>2</sup> University of Barcelona (UB), Department of Electronics, Marti i Franquès 1,08028, Barcelona,

Spain

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The conversion of methane into methanol is a promising technology in which can be reduced the negative impact of greenhouse gases and take advantage of liquid fuels. However, the high stability of CH<sub>4</sub> limits its conversion to high temperature and pressure conditions. Therefore, photocatalytic systems that proceed under mild conditions can play a significant role in the energy field. Prior studies indicate that WO<sub>3</sub> is a good candidate for this selective oxidation. Then, the performance of ordered mesoporous WO<sub>3</sub> catalyst was evaluated in the photocatalytic partial oxidation of methane to methanol with water for the first time, and the changes in the catalyst during the reaction was monitored by in situ DRIFTS analysis. Moreover, the influence of metal doping (M=La and Ni and Fe) on the photoactivity and the reaction mechanism over WO<sub>3</sub> surface modified by fluorine anions were also studied.

Keywords: CH<sub>4</sub> conversion; Mesoporous WO<sub>3</sub>; Methanol; Mechanism; In situ DRIFTS