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CQDs for the Sustainable Production of Solar Fuels and Chemicals

Juan Matos^{1,2,*}, Po S. Poon¹

¹*HYB&Car Group, UDT, University of Concepcion, Concepcion, Chile.*

²*Millennium Nuclei on Catalytic Processes towards Sustainable Chemistry (CSC), Chile.*

jmatoslale@gmail.com

jmatos@udec.cl

Solar fuels are a promising strategic pathway since they are produced from simple and abundant molecules from biomass-residues and using a sustainable and renewable energy source such as sunlight (**Figure 1**). This figure shows in a schematic way the different pathways our group is developing to achieve the sustainable production of solar fuels and chemicals.

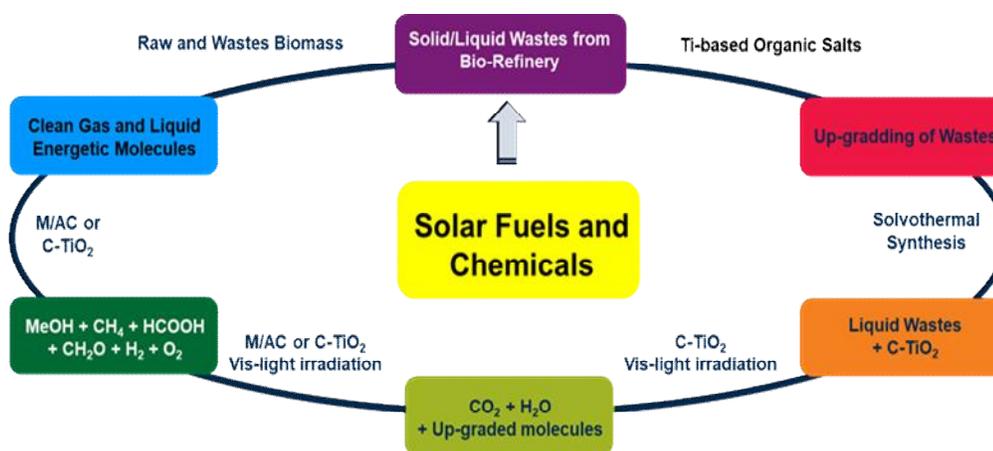


Figure 1. Strategic pathways for the production of solar fuels and chemicals.

This work will show the advances in the production of solar fuels using efficient carbon-quantum dots (CQDs) doped photocatalysts and results obtained in some model reactions will be shown. The efficiency for H₂ production by direct water splitting using TiO₂ is rather low, but it is notably increased in presence of electron donor molecules as sacrificial agents [1]. Aqueous pollutants can play the role of sacrificial agent and simultaneous H₂ production and pollutant removal can take place.

The photo-assisted valorization of furfuryl alcohol (FA) and 5-hydroxymethyl furfural (5-HMF), two products from the biorefinery industry, and glycerol (Gly), the main by-product of the biodiesel industry, is an innovative approach to explore because these target molecules can be photo-converted into aldehydes or ketones or even more valuable compounds such as five- or six-member dioxane-based carbocycles by condensation reactions [2].

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1. J. Matos, T. Marino, R. Molinari, H. García, *Appl. Catal. A: Gen.*, 417-418, 263 (2012)

2. J. Matos, et al. To be Submitted, 2019