New Synthesis Route for a Highly Active, Selective and Stable CO_2 Methanation Catalyst

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Presentation Preference: Oral

Career Level: Post Graduate Student

Aligned with Science Focus: CO_2 utilisation, hydrogen economy

Methane is a promising chemical for energy storage. Through the Sabatier reaction, renewable methane can be synthesised from atmospheric CO_2 and renewable H_2. Fuels in liquid state are desired for easier storage and transportation. On this regard, methane is strategic as its condensation temperature and volumetric density make its storable than H_2. This and other advantages of using methane over H_2 as the energy carrier have been acknowledged by several space programs which are currently developing new engine technologies to replace H_2 by methane. On Earth, as renewable H_2 still is still an expensive commodity, it is necessary to improve the CO_2 methanation process for minimum energy consumption and improvements in catalyst technology can help in that regard. This presentation will demonstrate a new synthesis route for very active Ru/ZrO_2 catalysts. The catalysts were synthesised under Sabatier reaction conditions using a Zr-based metal-organic template impregnated with Ru. The resulting catalyst structure was carefully investigated using a wide range of techniques which indicated the presence of hexagonal Ru^0 nanoparticles (2-5nm) highly dispersed on nano-ZrO_2 (10-20nm). Lastly, the catalyst's performance was assessed alongside several controls and at different reaction conditions, the catalyst demonstrated superior performance at all experiments.

Biographical Statement of speaker:

Miss Renata Lippi is a 3rd year Ph.D. candidate at University of Adelaide in collaboration with the CSIRO. Her research project involves the investigation of new catalysts for heterogeneous gas phase reactions.

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