Catalytic partial oxidation of methane on Hydrotalcites supported Rhodium catalysts : Role of Mg/Al ratio in varying the exothermicity and its relation to the activity

Tibra Mozammel(a,b,^); PR. Selvakannan(a); Jim Patel(b); Suresh Bhargava(a)
(a)CAMIC, School of Science, RMIT University, Australia; (b) CSIRO, Energy, Australia; (^) student

Presentation Preference: Poster

Career Level: Post Graduate Student

Aligned with Science Focus: General catalysed processes

Abstract:

Catalytic partial oxidation (CPOx) of methane is an exothermic methane reforming process to produce syn gas. This CPOx process has the potential to be scaled to a larger capacity with less capital investment - desirable for industrial operation. However, the catalyst stability due to the hot-spots formation and the cost associated with producing pure oxygen are the major challenges that need to be addressed. In this study, rhodium supported on hydrotalcites with varying Mg/Al ratio have been screened for the quest of highly active and stable CPOx reforming catalyst against hot-spots formation. Hydrotalcite with changing Mg/Al have different basicity, and varying basicity have different effect on active metal dispersion, reforming process and carbon deposition. Under similar process and feed conditions, each catalyst has shown different level of exothermicity and activity, which clearly demonstrate the role of supports are in control for the afore-mentioned properties. Pattern of temperature change throughout reforming with each catalyst have been observed along with methane conversion. All the fresh and used catalysts have been characterised utilizing XRD, XPS, BET-N_2 adsorption-desorption and TEM to understand the morphology change during reforming process.

Biographical Statement of speaker:

Tibra Mozammel Is a PhD student from RMIT University and working in a joint research project between CSIRO and RMIT (Mini DME project, funded by AISRF grand Challenge Fund). She completed her B. Sc. Engg. (Chemical)(Hons) from SUST, Bangladesh. Her field of studies are natural gas reforming, heterogeneous catalysis and reactor fabrication.