



Shanghai Cooperation Organization- 1st Young Scientists Conclave (SCO-YSC 2020)
A virtual event organised in India at CSIR-IICT, Hyderabad
Theme: Shaping SCO-STI Partnership: Young Scientists Perspectives

SCO-Young Scientist Profile

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**Designation
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Details of research work carried out in S&T (*limit to 200 words*)

My research focuses on the development of nanostructured materials for photocatalytic conversion of carbon dioxide and renewable hydrogen into fuels and feedstock chemicals toward efficient solar-to-chemical energy conversions. Among different solar-powered CO₂ hydrogenation processes, we are particularly interested in the photothermal reverse water gas shift (RWGS) catalysis which features the operation under ambient conditions and powered solely by sunlight to convert CO₂ into CO, an important feedstock for the chemical industry.

Associated SCO-YSC Theme: sustainable energy & energy storage

Statement of Innovation (*Brief information on new innovative ideas including startup / entrepreneurs- limit to 150 words*)

To date, most heterogeneous photocatalytic carbon dioxide reduction reactions are driven by photoexcited charge carriers in semiconductors. However, the range of sunlight that can be utilized by semiconductor photocatalysts is very limited owing to the restrict requirement on their band structure. Photothermal catalysis has emerged as an indirect pathway for converting the energy of absorbed photons into phonons (heat) to further drive the catalytic reactions. This process is capable of harvesting many more photons from the sunlight, particularly low-energy infrared light. Therefore, photothermal catalysis could greatly promote the solar-to-chemical energy conversion efficiency.

Major awards/ Achievements (*Upto 3 awards*)

2015 Banting Postdoctoral Fellowship Award

2013 Recipient of Alexander von Humboldt Fellowship for Postdoctoral Researchers

2013 MRS Spring Meeting Graduate Student Award (Silver Metal)

Possible collaboration with SCO countries (*limit to 100 words*)

Joint research on the catalytic mechanism is needed to better understand the photothermal catalytic process for the design of better catalysts with enhanced performance.

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Key words *(relevant to research work conducted as well as proposed innovation, 5-6 words)*

solar fuel, CO₂ reduction, photocatalysis, photothermal catalysis, solar energy