



## Influence of ZnO promoter on physicochemical and activity profile of novel carbon nanofibers based Cu-ZrO<sub>2</sub> catalysts for CO<sub>2</sub> hydrogenation to methanol

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### Abstract:

A series of novel carbon nanofibers (CNFs) based Cu-ZrO<sub>2</sub> catalysts were synthesized by deposition precipitation method. To investigate the influence of promoter, catalysts were loaded with 1, 2, 3 and 4 wt.% ZnO and characterized by ICP-OES, HRTEM, BET, N<sub>2</sub>O chemisorption, TPR, XPS and CO<sub>2</sub>-TPD techniques. The results revealed that physicochemical properties of the catalysts were strongly

influenced by incorporation of ZnO to the parent catalyst. Copper surface area (SCu) and dispersion (DCu) were remarkably increased by incorporation of ZnO promoter. Nevertheless, SCu and DCu were decreased when ZnO content was exceeded beyond 3 wt.%. The catalytic performance was evaluated by using autoclave slurry reactor at a pressure and temperature of 30 bar and 180 oC, respectively. The promotion of Cu-ZrO<sub>2</sub>/CNFs catalyst with 3 wt.% of ZnO enhanced methanol synthesis rate from 32 to 45 g/kg.h. Notably, with the ZnO promotion the selectivity to methanol was enhanced to 92% compared to 78% of the un-promoted Cu-ZrO<sub>2</sub>/CNFs catalyst at the expense of a lowered CO<sub>2</sub> conversion. In addition, the catalytic activity of this novel catalyst system for CO<sub>2</sub> hydrogenation to methanol was compared with the recent literature data.

### Biography:

Dr. Israf Ud Din has completed his PhD at the age of 35 years from Universiti Teknologi Petronas, Malaysia. He is the Assistant Professor in Physical Chemistry at Kohat University of Science and Technology, Kohat Pakistan. He has published more than 12 papers in reputed journals and has been serving as an editorial board member of repute.