Presentation Title: Electrochemical CO_2 reduction to Ethanol mediated by novel Sn-SnO_2 Supported Cu Single Atoms

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Abstract

The electrochemical reduction of CO_2 into multi-carbon containing products with high activity and selectivity still remains a big challenge. Herein, we propose a novel Cu-SACs (Cu single atoms catalyst) supported on tin-tin oxide (Cu_{SA}-Sn-SnO_2) synthesized following a simple wetness impregnation and sequential reduction method for the direct conversion of CO_2 into ethanol, which shows good product selectivity, activity, and stability. It is confirmed that the copper single atoms with an oxidation state close to 1 are stabilized on the Sn-SnO_2 substrates. The electrochemical analysis of Sn-SnO_2 displays selectivity towards other products apart from CO and H_2. With the impregnation with Cu single atoms, the products on the Sn-SnO_2 surface shifts from HCOOH to ethanol. With the increase in Cu content, the ethanol production increases at the expense of CO, pointing towards dimerization of C1 products. The synthesized catalyst exhibited a remarkable selectivity towards ethanol production with high stability.

Biography

Muhammad Aurang Zeb Gul Sial did his PhD from the Department of Chemistry, Tsinghua University under the supervision of Prof. Xun Wang's group. He received his BS degree from the University of Sargodha in 2013 and a Master's degree in Physical Chemistry from Quaid-i-Azam University Islamabad, Pakistan, in 2015. Dr Sial also worked a post doctor and Hongshen Young Teacher in Shenzhen and Chongqing University respectively. Currently, he is working as a postdoctoral fellow at the Interdisciplinary Research Center for Hydrogen Technologies and Carbon Management (IRC-HTCM), King Fahd University of Petroleum & Minerals (KFUPM), Saudi Arabia. His research interests include the synthesis of metal supported single atoms catalysts and their applications in water electrolysis, CO_2 reduction.