Journal of Tissue Science and Engineering
ISSN 0976-8505
2020
Vol.11 No.3

Heterogeneous Catalysis: A Solution for Sustainable Society

Dinesh Bhalothia [1*] and Tsan Yao Chen [1*]

[1.] Department of Engineering and System Science, National Tsing Hua University, Hsinchu 30013, Taiwan

Abstract

Mitigation of global energy crisis and adverse climatic impacts (rising CO_2 emission) relies on the implementation of sustainable energy economy. In this context, catalytic transformations of carbon dioxide (CO_2) to fuel/chemical feed-stocks and to improve the sluggish kinetics of oxygen reduction reaction (ORR), a central limiting index preventing fuel cells from "seizing the market" are of paramount importance factors. A critical element in the pursuit of these quests is development of economical and efficient nanocatalysts (NCs). Effective strategies in solving aforementioned issues have been widely studied, however, promising and efficient techniques are still far awayto attain commercial standards. Our research aims to disclose oxygen reduction and heterogeneous CO_2 conversion pathways in photo / electrochemical reactions to investigate the performance descriptors. For improving structural reliability and activity, surface modifications on hierarchical structured multi-metallic heterogeneous NCs (comprising metal-metal or metal-oxide conjunctions) via 3d-transition metal based atomic to nano scale clusters deposition has been done. Such an architecture enables interfacial local strain and quantum confinement coupling effects to confine chare (i.e. electrons) at catalyst surface and thus boost the oxygen reduction and photo / electrochemical CO_2 conversion reaction kinetics. The *in-situ* synchrotron X-ray absorption, emission and diffraction spectroscopies were conducted to systematically investigate the materials properties.

Biography:

Dr. Dinesh Bhalothia is a Postdoctoral scientist at department of engineering and system science, National Tsing Hua university, Taiwan. He did his graduation (B.Tech) and postgraduation (M.Tech) from University of Rajasthan, India. Further he received prestigious NTHU international student scholarship for PhD studies and completed his PhD from Institute of electronics engineering, National Tsing Hua university, Taiwan. He has more than 18 publication in international journals. Currently he is working on development of multi-metallic heterogeneous catalysts and ***in-situ*** investigation of their physical and chemical properties via synchrotron X-ray (XAS, PFY-XAS, XRD and APXPS) characterizations for various green energy (cathode material for Li-ion battery, ORR, Formic Acid Oxidation, CO_2 conversion and H_2 production/storage) applications.

Speaker Publications:

6th Euroscicon Conference on Nanotechnology July 30, 2020, Online Event

Abstract Citation:

Dinesh Bhalothia, Heterogeneous Catalysis: A Solution for Sustainable Society, 6th Euroscicon Conference on Nanotechnology July 30, 2020, Online Event.