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2021 International Green Energy Conference

(IGEC-XIII)

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Name	Yimin Wu
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Invited Plenary Lecture

Presentation Title	**Semiconductor assisted photocatalysis for CO_2 reduction to liquid solar fuels**
Abstract (Approximately 200 words)	Development of sustainable and clean sources of energy, and mitigation of greenhouse gas emissions such as CO_2, is among the greatest challenges facing our planet. Recently, electroreduction has attracted considerable interest for removal of gaseous CO_2. However, it is inherently energy inefficient. Solar energy is the largest primary energy source available. Photocatalytic reduction of CO_2 using solar energy offers an efficient way to convert and store solar energy in the form of chemical fuels, particularly liquid fuels such as methanol. This invited talk will focus on CO_2 reduction in a metal oxide system, namely Cu_2O as inexpensive photocatalysts with good mutlielectron transfer properties due to its loosely bonded d electrons. Cu_2O shows intrinsic p type conductivity due to the presence of negative charged Cu vacancies with one of the lowest electron affinities, identifying Cu_2O as an optimal candidate for reduction of CO_2. Atomic level understanding of active sites in Cu_2O will be presented, that leads to the discovery of the facet specific adsorption and subsequent light induction of CO_2 exclusively into liquid fuel-methanol. The activity of these active sites will be unraveled, in operando, on a single particle level, nanoparticles are designed with high active facet selective active sites and particles activity.
Biographical Sketch (Approximately 200 words)	Dr. Yimin Wu is an assistant Professor in the Department of Mechanical and Mechatronics Engineering and Waterloo Institute of Nanotechnology (WIN), Director of Materials Interfaces Foundry, at the University of Waterloo. Dr. Wu received his DPhil degree in Materials from the University of Oxford in 2013; then worked as a SinBeRise Postdoctoral Fellow at the University of California, Berkeley, and Lawrence Berkeley National Laboratory. Prior to joining Waterloo in 2019, he was focusing on the advanced catalysts and battery research at Argonne National Laboratory and worked as a research assistant professor at University of Illinois. He has published more than 40 high-quality journal papers in prestigious journals such as Nature, Nature Energy, and Nature communications. He is also listed as a primary inventor on 1 US/international patent. His research has been highlighted by mainstream media including Canadian Press, CBC news, BNN Bloomberg, and French Science Magazine. He has won many awards including WIN research leaders award (2020), MIT Technical Review Innovators Under 35 Award Finalist (2020), SinBeRise Postdoctoral Fellowship at the University of California, Berkeley (2013), UK EPRSC Doctoral Prize (2012), Chinese Government Award for Outstanding Students Abroad (2012). His research has been funded by both federal and provincial government agencies.