

Seminar Talk

Bijandra Kumar, Ph.D.
Assistant Professor
Department of Technology
Elizabeth City State University

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3:00 p.m. KH 224

Title: New Generation of Nanostructured Catalysts for CO₂ Electrochemical Conversion into Fuels

Abstract:

Electrochemical carbon dioxide reduction to fuels is a carbon-neutral process, contributing to sustainability and helping to mitigate potential climate change. If the process is run by using renewable energy sources, it can also be used to resolve intermittency issue associated with these technologies (such as solar and wind energy). Hence, it is a highly desirable goal to convert CO₂ into fuel precursors such as carbon monoxide, ethylene, methanol, or formic acid using renewable sources of energy (i.e. solar, geothermal, wind, etc.) as the energy input for the process, thereby presenting a convenient way to recycle CO₂ into fuels. The central problem with this approach, however, is the higher over-potential needed for the conversion of CO₂ into useful fuels, stability and poor product selectivity of the catalysts. Therefore, synthesis of new nanomaterials with merits of low cost, high efficiency, and outstanding properties is essential. Here, I will mainly discuss recently discovered non-noble metals catalysts, which can potentially replace noble metals for CO₂ electrochemical conversion process.

Bio:

Bijandra Kumar joined the Department of Technology at ECSU as Assistant Professor in 2017. He has completed his PhD in Material Science and Engineering from Université Bretagne Sud (IRD/CNRS 6027), France in 2010. Dr. Kumar's research interests focus in developing nanomaterial based biomarker sensors, electro-catalytic reactions, electro-chemical energy storage (e.g., metal-ion and metal-air batteries) and energy conversion (e.g., CO₂ reduction reaction, hydrogen evolution reaction, water splitting reaction) systems as well as design, synthesis, and characterization of advanced materials for energy-related applications. In particular, his research activities are focused towards storing renewable energy in the form of chemical bonds via using electrochemical and photo-electrochemical process. He has been awarded Proof-Of-Concept innovation awards for his discovery. He has published more than 40 research articles in highly ranked journals of the world such as Nature, Science, Energy and Environmental Science, ACS nano, Nano Letters, and Angewandte Chemie. He has registered as Co-PI 6 USA patents applications. His work has been cited more than 2000 times as listed at google scholar. His research has been highlighted in news outlets including Chemistry World Magazine, Chemical

and Engineering News, Science, Science Daily, Scientific Americans, Nature Climate Change, IEEE Spectrum, and PC World.