DEPARTMENT OF CHEMISTRY AND ENVIRONMENTAL SCIENCE
VIRTUAL SEMINAR SERIES
SPRING 2021

DATE: WEDNESDAY, MARCH 10

TIME: 12:30-1:50pm

LOCATION:
https://njit.webex.com/njit/j.php?MTID=mdfe4f718778e9a7ffb4eefa8ea5acb98

Meeting number: 1202085541
Meeting password: yaP9itPpR74

Join by video system:
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You can also dial 173.243.2.68 and enter your meeting number

Join by phone:
1-650-479-3207 Call-in toll number (US/Canada)

GUEST SPEAKER

Dr. Pravas Deria
Assistant Professor
Department of Chemistry & Biochemistry
Southern Illinois University

TOPIC

Understanding Excited State Processes and Dynamics in Metal-Organic Frameworks

ABSTRACT

Abstract: Efficient photonic energy conversion, either voltaic or chemical, in an entirely artificial system is challenging. This is largely due to the demands of supramolecular design that function as an efficient antenna to generate high quantum yield redox equivalents (*i.e.*, charges with required potential). We have shown that exquisite assembly of chromophoric linkers in MOF can manifest unique photophysical and photochemical properties and the subsequent excited state processes can have similar impacts as we see processes in natural light-harvesting complexes (LHC). We have significantly focused on the robust Zr^{IV}-carboxylate MOFs as the high bandgap Zr-oxo nodes allow to probe photophysical properties and processes that are purely dictated by the organization of the linkers.

Some of these unique features include spatially dispersed excited state which impact the efficiency of energy transfer as well as excited state complex formations. These understandings help helped us to modulate the (i) energy migration, (ii) excited state lifetime, and (iii) efficient charge-carrier generation. Our MOF-based artificial LHC system, so far, has displayed MOF* → 'special-pair' energy transfer followed by charge separation with $k_{EnT} \approx 4.7 \times 10^{11}$ s^{-1}, and a $k_{Cs} = 1.2 \times 10^{10}$ s^{-1} upon a panchromatic excitation (350-600 nm).

BIO

Dr. Pravas Deria obtained his PhD from the University of Pennsylvania in 2009 followed by two postdoctoral research positions in the Duke University and Northwestern University. He joined department of chemistry and biochemistry of Southern Illinois University as an assistant professor in 2015. His group interested in the physical properties of self-assembled porous compositions relevant to light-driven chemistry and energy conversion. Their research aims to unveil the unique physicochemical behavior of molecular assemblies that are unattainable in the solution dissolved phase. The knowledge is used as a feed to design new compositions with improved photophysical and photochemical properties. They apply state-of-the-art time-resolved spectroscopic and electrochemical techniques to address the global sustainable energy demand. His research is recognized by the prestigious NSF CAREER Award in 2020 and other early career faculty awards.

Committee members:

Professor Michael Eberhart – michael.s.eberhart@njit.edu
Professor Farnaz Shakib – farnaz.a.shakib@njit.edu