Understanding Complex Chemical Reactions via High-Resolution Mass Spectrometry

In the reactivity of complex chemical systems, the crucial reaction steps are often determined by highly unstable intermediate species. These intermediates are formed relatively slowly and may react away rapidly, so they are difficult to isolate and study in detail. In this talk, Dr. Popolan-Vaida will present results in which high-resolution mass spectrometry, in conjunction with synchrotron-based techniques, are used to detect and identify exotic intermediate species critical for understanding the mechanism of complex chemical reactions involved in combustion and atmospheric chemistry.

Dr. Popolan-Vaida’s research areas include atmospheric and combustion chemistry. Prior to joining UCF, she earned a Ph.D. in physical chemistry from the University of Ulm, Germany and was a postdoctoral research fellow at the University of California, Berkeley and Lawrence Berkeley National Laboratory. Dr. Popolan-Vaida is the co-author of more than 30 peer-reviewed scientific publications. She has been awarded with honors including the Feodor Lynen Research Fellowship, DAAD Scholarship (German Academic Exchange Program), Erasmus Scholarship and the European Mobility Scheme for Physics Students Scholarship.

Taking the Temperature of Solar System Airless Bodies: Insights from NASA’s Lunar Reconnaissance Orbiter

Much of what we know today about the moon’s composition comes from orbital spacecraft mapping its surface. Particularly, the sunlight reflected off of and the heat emitted from its surface have been used to characterize the mineralogical diversity of the lunar crust by comparing observations with analog materials measured in the laboratory. In this talk, Dr. Donaldson Hanna will discuss the current understanding of the moon’s composition and what we will learn from upcoming landed and orbital NASA missions to the moon.

Dr. Donaldson Hanna’s research combines spacecraft and telescopic observations of solar system planetary bodies with laboratory measurements of analog materials utilizing bespoke environment chambers. Before joining UCF, she was a UK Space Agency Aurora research fellow within the planetary surfaces and experiments group at the University of Oxford. She received a B.S. in space sciences at Florida Institute of Technology and then an M.S. and Ph.D. in geological sciences at Brown University. She is a co-investigator on several space missions including the Diviner Lunar Radiometer Experiment, L-CIRiS and Lunar Trailblazer, and is a participating scientist on the OSIRIS-REx mission.

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Bit More “Colorful” Night: Infrared Vision Based On One Atom Thick Graphene

This talk will outline a novel strategy for uncooled, tunable, multispectral infrared detection. Due to the low photon energy, detection of infrared photons is challenging at room temperature. One atom thick graphene offers an alternative mechanism bypassing material bandgap restriction. Further, the ability of carrier concentration modulation on graphene via external voltage offers dynamic spectral selectivity for “color” night vision/sensing. The performance of preliminary demonstration compares favorably even with present cryogenically-cooled detection schemes.

Dr. Chanda received his Ph.D. from the University of Toronto and completed a post-doctoral fellowship from the University of Illinois at Urbana-Champaign. He is a recipient of the 2012 DOE Energy Frontier Research Center Solar Energy Future Direction Innovation Proposal Award, the International Displaying Future Award (2016) by Merck Germany, the UCF Reach of the Stars Award (2018) and the UCF Luminary Award (2020).