Announcing the Final Examination of Bijoya Dhar for the degree of Doctor of Philosophy in Physics

Date: April 05, 2021
Time: 09:00 a.m.
Zoom Link: https://ucf.zoom.us/j/95268943149?pwd=VHoyZUpQYmU3dDN2MHMzZzA0QXZiQT09
Meeting ID: 952 6894 3149
Passcode: 642166
Dissertation title: Development and surface science investigations of epitaxial thin films.

Abstract:
The growth and characterization of epitaxial thin films sees ubiquitous use in both research and applications spanning a number of scientific and industrial fields with overlapping interests in materials science. The central theme of this work centers on leveraging the structural control afforded through ultrahigh vacuum (UHV) approaches to thin film epitaxy to derive atomically specific structure-chemistry relationships of key importance to various interface-mediated reactions. After a brief discussion of efforts to develop and characterize the growth of Au/Ta(110) and CeO_2/Ag(100) films, the majority of this presentation will focus on a detailed exploration of efforts undertaken to better understand key structure-chemistry relationships central to water cycling processes on relevant to the continual evolution of the Lunar surface under the influence of Solar wind interactions. The first part of this discussion will present results from D_2O temperature programmed desorption (TPD) studies conducted on single-crystalline $Al_xSi_yO_2$/Ru(0001) bilayer films used to simulate surface properties expected at Feldspar interfaces. This discussion, which aids in the disambiguation of a standing discrepancy in the surface science and zeolite communities, will lead to a key postulate linking the nature of the charge-compensating species present in different $[A^+]_x$-$Al_ySi_zO_2$ mineralogical structures to the barrier for deprotonation via recombinative desorption of water and the lower temperature persistence of molecular water at temperatures relevant to the daytime environment of the lunar surface at different latitudes. A follow up study will demonstrate practical implications of this postulated relationship on realistic anorthite and albite end members of the plagioclase series of Feldspars, with anorthite (albite) exhibiting stronger (weaker) barriers to recombinative desorption of water via deprotonation of isolated hydroxyl groups.

Outline of Studies:
Major: Physics

Educational Career:
M. S. in Physics, University of Central Florida, USA, 2015
M. S. in Physics, University of Dhaka, Bangladesh, 2012
B. S. in Physics, University of Dhaka, Bangladesh, 2010

Committee in Charge:
Dr. William Kaden (Chair)
Dr. Christopher Bennett
Dr. Daniel Britt
Dr. Richard Blair (External Committee Member)

Approved for distribution by Dr. William Kaden, Committee Chair, on March 19, 2021.

The public is welcome to attend.