

Announcing the Final Examination of Mr. Jeronimo Matos for the degree of Doctor of Philosophy in Physics

Date: October 20, 2015

Time: 3:00 p.m.

Room: PSB161

Dissertation title: A Theoretical and Experimental Investigation of the Physical and Chemical Properties of Solid Nanoscale Interfaces

With the emerging interest in nanoscale materials, the fascinating field of surface science is rapidly growing and presenting challenges to the design of both experimental and theoretical studies. The primary aim of this dissertation is to shed some light on the physical and chemical properties of selected nanoscale materials at the interface. Furthermore, we will discuss the effective application of cutting edge theoretical and experimental techniques that are invaluable tools for understanding the systems at hand. To this effect, we use density functional theory (DFT) with the inclusion of van der Waals (vdW) interactions to study the effect of long range interactions on the adsorption characteristics of various organic molecules (i.e. benzene, olympicene radical, and sexithiophene) on transition metal surfaces. Secondly, the detailed analysis of x-ray absorption spectroscopy (XAS), scanning transmission electron microscopy (STEM), x-ray photoelectron spectroscopy (XPS) and atomic force microscopy (AFM) measurements will be presented. These investigations will be dedicated to the study of (i) the effect of pre-treatment on the coarsening behavior of Pt nanoparticles (NPs) supported on γ -Al₂O₃ and (ii) deconvoluting the intrinsic (size effects) and extrinsic (ligand effects) physical and electronic properties of Au NPs encapsulated by polystyrene 2-vinylpyridine ligands.

Major: Physics

Educational Career:

M.S. University of Central Florida, 2013

B.S. University of Central Florida, 2011

Committee in Charge:

Dr. Abdelkader Kara

Dr. Helge Heinrich

Dr. Artem Masunov

Dr. Patrick Schelling

Approved for distribution by Dr. Abdelkader Kara, Committee Chair, on October 9, 2015.

The public is welcome to attend.