Schuler, Timothy M

From: Diebold, Ulrike
Sent: Tuesday, November 10, 2009 7:13 PM
To: Diebold, Ulrike
Subject: Physics Colloquium, Tuesday, Nov 17, 3:20 pm

Colloquium
Department of Physics and Engineering Physics
Tuesday, November 17, 2009
Boggs 242
3:20 pm

Scanning Tunneling Microscopy of TiO2 Surfaces

Shao-Chun Li
Department of Physics and Engineering Physics
Tulane University

The research focus of our group is to investigate and tailor the geometric and electronic structures of solid state surfaces, particularly metal oxides, and to explore their physical and chemical properties by using the state-of-art surface science techniques such as scanning tunneling microscopy, low energy electron diffraction and photoemission spectroscopy.

Since the invention of STM in the early 1980's, its capability of high resolution imaging at atomic scale has allowed scientists to obtain direct structural information of the surface and to understand the surface physical and chemical properties atom by atom. In this talk, I will highlight some fundamental studies on the TiO2 surface by using STM combined with other spectroscopes.

TiO2 has found various technological applications during the past decades in the fields of catalysis, photo-catalysis, solar energy conversion, and water splitting etc. However, to understand the mechanism of the catalytic reactions occurring on this material is still the main task of scientists. Water is an important compound and exists everywhere, which could drastically influence the materials' properties. It has been found that water is adsorbed on surface oxygen vacancy sites of TiO2 and splits into two hydroxyl (OH) groups. In the first part, I will present the study of how the surface hydroxyl groups influence the adsorption of a gas molecule (NO) and enhance the surface dynamics of an organic compounds (Catechol, C6H4(OH)2) on the TiO2 surface. In the second part, the catalytic performance of TiO2 on the N-contained aromatic compound synthesis will be addressed with the model molecules of azobenzene (C6H5N=NH5C6) and aniline (C6H5NH2).