

# Electronic Motions and Excitations in Nanostructured Surfaces by Ion-Surface and Adsorbate-Surface Reactions

## Computational Nanophysics

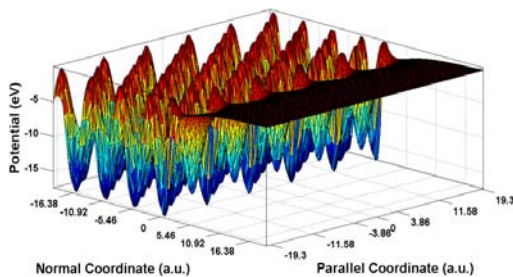
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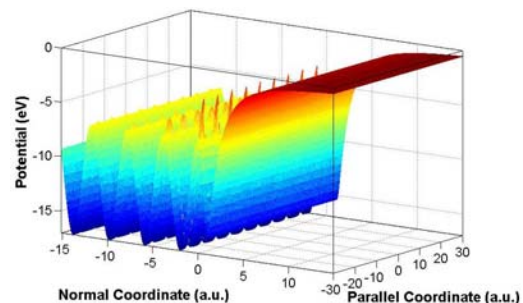
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**Description:** Industries that thrive on the continued miniaturization rely heavily on the nanomaterial world in order to harness power that exists at the quantum scale. A promising way to access this power is to design nanoscopic functionalities in periodic patterns on atomically well-defined surfaces. Understanding the electronic structure and interaction of such “designer surfaces” will provide researchers ways to uncover the technological potential of these surfaces, to determine their suitability as templates for further growth of the architecture, and to examine the evolution of their chemical reactivity. The electron transfer between an appropriate atomic species and a nanostructured metal surface can serve as a powerful probe to uncover the details of the electron’s excitation and decay processes in the *nanoenvironment*.

This program undertakes a study of the electron dynamics in mono-crystalline metal surfaces with regular nanostructures, including (a) metallic and fullerene over-layered surfaces; (b) stepped vicinal surfaces; and (c) surfaces with arrays of nanowires, clusters of nanoislands, and distributions of quantum dots.



Force field in mono-crystalline Palladium surface



Force field of vicinal nanosteps on mono-crystalline Copper surface

## ➤ Student Researchers (since 2008)

- Andy Schmitz (2 journal publications, 5 conference presentations; Currently in Graduate School PhD Program, University of Nevada, Reno)
- Ryan O’Connell ( 1 conference presentation)
- Hee Suk (Victor) Lee (2 conference presentations; Currently in Cornell University)
- Jason Saurbrei (1 conference presentation; Currently in Missouri University of Science and Technology, Rolla)
- Peter Sable (1 conference presentation)