BIG energy seminar series

Addressing the scale and complexity of the global energy challenge.

Harvesting Energy from Electrochemical Interfaces

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Materials Science Division
Argonne, IL, USA

Date: Tuesday, February 19th, 2:30 pm
Location: JSCBB building (see link to map below)

Abstract:

The research effort aimed to the fundamental understanding of processes that are relevant for energy conversion and storage will be presented. Atomic scale insight at the electrified solid-liquid interfaces is considered critical in further advancement of materials that could be implemented in electrochemical systems such as electrolyzers, batteries and fuel cells. It has been demonstrated that fine tuning of the material properties can lead towards unprecedented improvements in their functional properties that are relevant for energy conversion and storage. This presentation will address unique research approach that is capable of revealing structure-function relationships in the design of materials for electrochemical systems. The following topics will be discussed: 1) well-defined materials obtained by varying their surface structure, composition profile and electronic properties; 2) atomic/molecular insight into electrified solid-liquid interfaces; 3) theoretical modeling of electrochemical systems; 4) identification of the active and the most vulnerable surface sites under reaction conditions; 5) insight into chemical nature between the surface atoms, reactants, and molecular species in the electrolyte; 6) design and synthesis of advanced materials with desired size, shape and composition profile; 7) ex-situ and in-situ characterization of tailored electrochemical interfaces. This synergistic approach encompasses highly diverse experimental and theoretical methods and has been proven to serve as a foundation in the development of materials for electrochemical applications.

Bio: Dr. Vojislav R. Stamenkovic

Vojislav R. Stamenkovic received a Ph.D. degree in physical chemistry from University of Belgrade in 2001 after spending three years as a visiting scientist at the University of California at Berkeley. From 2002 to 2005 he was as a postdoctoral scientist within Materials Sciences Division at the Lawrence Berkeley National Laboratory. He received a Recognition Award from Lawrence Berkeley National Laboratory in 2004, for implementation of fundamental science into nanoscale applications. Since 2006, he is a staff scientist at Materials Science Division in Argonne National Laboratory. His expertise is in solid state physics, physicochemical processes at solid-liquid and solid-gas interfaces, surface science, and electrochemistry. His research interest includes functional nanomaterials, catalysis/electrocatalysis, reaction mechanisms, spectroelectrochemistry, and bioelectrochemistry. In order to resolve fundamental properties of materials he is combining surface specific tools in ultra-high vacuum for atomic scale characterization and surface modifications such as low energy ion scattering (LEIS) spectroscopy, Auger electron spectroscopy (AES), x-ray photoelectron spectroscopy (XPS), ultraviolet photoelectron spectroscopy (UPS), scanning tunneling and atomic force microscopy (STM/AFM), low energy electron diffraction (LEED), electron beam evaporation of sub and multilayered thin films as well as physical vapor deposition. In addition to ultra-high vacuum studies related to solid-liquid and solid-gas interfaces he is utilizing in-situ vibrational spectroscopies such FTIR and Raman along with mass spectroscopy (DEMS).

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