Chemical & Biomolecular Seminar Series

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Materials Science Division

Argonne National Laboratory

Friday, November 17, 2017

10:00—11:00 a.m.

102 Colburn Lab

Nenad Markovic is a Distinguished Fellow, Group Leader, and Chief Scientist for the Joint Center for Energy Storage Research at Argonne National Laboratory. Previously he was a Staff Scientist and Principal Investigator at Lawrence Berkeley National Laboratory from 1991-2005. He received his B.Sc., MsD and Ph.D. degrees all from the University of Belgrade, and served as Group Leader at the Institute of Electrochemistry, University of Belgrade. He is one of the pioneers of the development of electrocatalyst materials for fuel cells and electrolyzers. More recently he has advanced a surface science-based approach to advance lithium ion battery technologies. He is the author or co-author of over 270 papers and fifteen US patents. He has also received many awards, including the 2016 Wilhelm Manchot Research Professorship (Technical University of Munich) and the 2013 Faraday Medal Award.

The Renaissance of Electrochemistry

Developing and deploying renewable energy technologies will require the application of knowledge, concepts, and tools from a variety of fields including chemistry, materials science, physics and, in particular, electrochemistry []. Electrochemistry is, in the broadest sense, the study of relationships between the transformation of electrical energy in chemical bonds and, in the reverse process, the energy stored in chemical bonds back to electrons that can power electrochemical energy storage and conversion systems Central to this presentation will be to introduce - *at atomic and molecular levels* - electrochemical interfaces in aqueous and organic environments and to argue that we are witnessing the renaissance of electrochemistry. Key correlations will be discussed, including structure-function relationships, functional links between covalent and non-covalent interactions, the role of pH values, and key descriptors that control functional links between activity, stability, sensitivity and conductivity of the interface. Fundamental understanding of critical electrochemical processes at interfaces will provide ample opportunities (and challenges) to further improve the current landscape of sustainable energy production and utilization. We will conclude by asking us what we don't know but we would like to know about electrochemical interfaces.