Invited Lecture

Title：Design and understand nanostructures and interfaces for energy conversion and storage

Speaker： Prof. Guozhong Cao
University of Washington

Date &Time： **10:30 -11:30 Apr. 1, 2014（Tuesday）**

Venue： **Meeting Room 438, IPE Mansion**

Introduction

Dr. Guozhong Cao is Boeing-Steiner Professor of Materials Science and Engineering, Professor of Chemical Engineering, and Adjunct Professor of Mechanical Engineering at the University of Washington, Seattle, WA. He received his PhD degree from Eindhoven University of Technology (the Netherlands), MS from Shanghai Institute of Ceramics of Chinese Academy of Sciences, and BS from East China University of Science and Technology (China). He has published over 260 SCI journal papers, authored and edited 7 books, and presented over 200 invited talks and seminars. His current research is focused mainly on chemical processing of nanomaterials for energy related applications including solar cells, lithium-ion batteries, and supercapacitors. Dr. Cao can be reached at gzcao@uw.edu or 206-616-9084.

Devices and systems based on appropriately designed and fabricated nanostructures and nanomaterials can demonstrate remarkably enhanced performances. The large specific surface area and short diffusion distance can surely enhance the interface and transport kinetics, while the surface energy and defects will impact the phase transition and reaction thermodynamics. In this presentation, I will use three examples to illustrate how energy conversion and storage efficiency can be significantly improved through careful design and engineering of materials on the nanometer and micrometer scales and through surface chemistry modification. The first example is nanostructured photoanodes for dye-sensitized solar cells and quantum dot-sensitized solar cells. The second example is nanostructured electrodes for lithium-ion batteries. Nanostructured electrodes have demonstrated specific energy and specific power improvements with excellent cyclic stability. Further enhancement in energy density can be achieved through introduction of defects and modification of surface chemistry. The third example is the manipulation and control of nanostructures and surface chemistry of porous carbon for supercapacitors.