

Nanoscale Electrochemistry and materials Design

Electrochemistry Fundamentals (Prof. Don Gervasio, 3hours)

Long before “nanotechnology” became a word electrochemists were handling nanoparticles as catalysts and electrode separators. This is an introduction to fundamentals of electrochemistry, including the origin of the structure of the electrochemical interface, electrochemical potential and relationship to generation of non-Faradaic and Faradaic currents.

Electrochemical Characterization: (Prof. Don Gervasio, 3 hours)

Use of electrochemical methods to characterize solution and surface chemistry will be presented to determine the performance of nanocatalysts – surface area, activity, selectivity, chemical kinetics, molecular activation, etc. and nanostructured polymers as electrolytes for capacitor, battery and fuel cell materials and in sensors.

Optional:

Electrochemical Workshop: (Prof. Don Gervasio, 3 hours)

This is a hands on session for Electrochemical Characterization (above). An optional laboratory course may be schedule if there is interest to visit University of Arizona or if suitable facilities can be set up elsewhere. This course will demonstrate solution and surface non-steady state analyses with conventional and ultramicroelectrodes and steady state methods including impedance spectroscopy and polarization method including rotating ring-disk electrodes using Kotechy-Levich kinetic analysis and “fuel cell” type I/V curves with nanoparticle catalyzed gas-fed porous electrodes.

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