nanoHUB-U Special Edition

nanoHUB-U offers NEW course

FUNDAMENTALS OF RECHARGEABLE BATTERIES

Register TODAY! Course opens April 17

A $30 instructor-paced course brought to you by nanoHUB-U

Taught by Purdue Associate Professor R. Edwin Garcia

This five-week short course aims to introduce students to to the materials science of rechargeable batteries using a unique, "bottom up" approach.

Course Objective

This course will provide an introduction to the fundamentals behind the equilibrium and time-dependent response of existing and emerging chemistries of Li-ion battery materials. Effects of material selection and processing on the performance and reliability are presented as a means to develop conceptual guidelines to understand and improve battery designs. Example applications such as intercalation, SEI, and dendrite growth are presented. Integration of experimental microstructural aspects to coarse-graining measured properties, such as porosity, tortuosity and its associated reactivity, and classic and emerging battery architectures are presented. Principles summarizing the response of battery architectures are formulated and applied to propose battery design guidelines, to review existing porous electrode theory descriptions, and to summarize the current state-of-the-art of battery technology and its associated metrology.

Scientific Overview

Course Information and Registration

COURSE SCHEDULE:
April 17- May 22
WEEK ONE:
Basic Concepts, Fundamentals, and Definitions
WEEK TWO:
Thermodynamics of Battery Materials
WEEK THREE:
Tortuosity and Porosity in Battery Materials
WEEK FOUR:
Reversible and Irreversible Interfacial Reactions
WEEK FIVE:
Rationalizing Classic and Advanced Battery Architectures and Design Guidelines

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