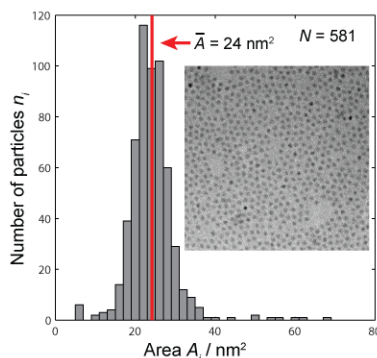
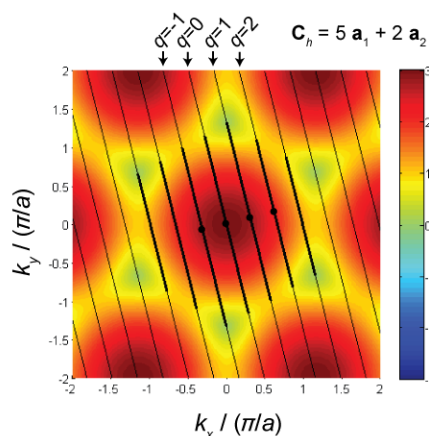


SPECIAL TOPICS IN PHYSICAL CHEMISTRY

NANOSCIENCE:

Chemistry and Physics of Low-Dimensional Materials

CHEM 649 / 749 – SPRING 2023



COURSE TOPICS

- 1. Wavefunctions** in crystalline materials including metals and semiconductors
 - **Band theory:** metals and semiconductors
 - **Quantum confinement** and concepts of dimensionality
- 2. Diffusive motion**
 - Of **charge carriers** in solids and devices like solar cells!
 - Of **ions and colloidal particles** in solution!
- 3. Statistical descriptions of size and size distributions**
- 4. Synthetic routes** to nanostructures via chemistry and via microfabrication
- 5. Representative applications** of nanomaterials in **biomedical imaging** and in **energy conversion and storage**.

Pertinent articles from the primary literature will be discussed in class. No final exam! A final presentation enables students to explore an independent topic.

Text: *Introductory Nanoscience* by Masaru (Ken) Kuno (2011). Credits: 3

TIME & PLACE

Tuesday / Thursday 10:05 AM – 11:20 AM
Science & Technology Building (STB, 1112 Greene St) Room 412

INSTRUCTOR

Andrew B. Greytak
Department of Chemistry and Biochemistry
Email: greytak@sc.edu / Tel. 803-777-0672

RECOMMENDED

Calculus-based Physics

PREP

Quantum Mechanics

(INFORMAL)

Thermodynamics

Build your understanding of size-dependent physical properties in materials, and synthetic routes to materials with nanometer-scale dimensions under kinetic control. An emphasis is placed on systems displaying size-dependent electronic and optical properties including inorganic nanostructures. These concepts will enable students to understand and innovate in many areas of nanoscience.

Graduate students, including BS/MS students, and undergraduates with the prerequisites, are welcome!

Grad students register **Chem 749, section 001**

Undergrads register **Chem 649, section 003** (simplified final project).

