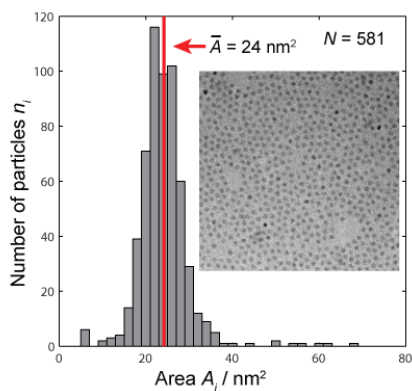
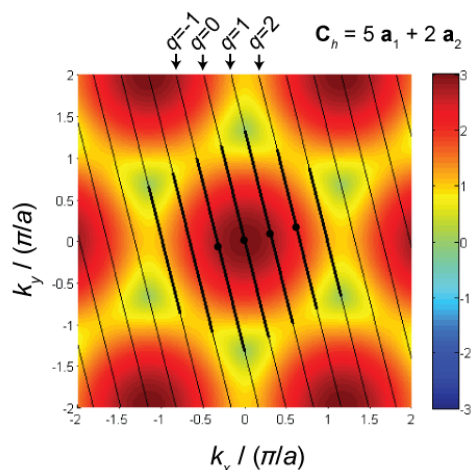


# NANOSCIENCE:

## Chemistry and Physics of Low-Dimensional Materials

### CHEM 749 – SPRING 2020



#### COURSE TOPICS

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

Pertinent articles from the primary literature will be discussed in class.

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

#### TIME & PLACE

Monday / Wednesday 8:05 AM – 9:20 AM: Jones PSC 115

#### INSTRUCTOR

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

#### PREREQUISITES

Calculus-based Physics  
 Quantum Mechanics  
 Thermodynamics

This course will build 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 001. Credits: 3.