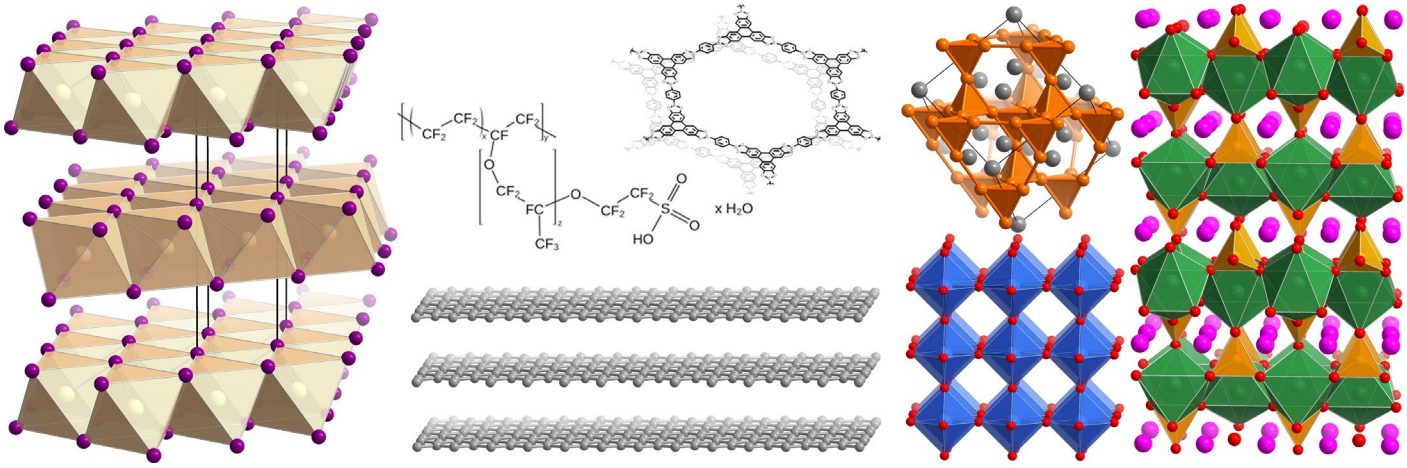
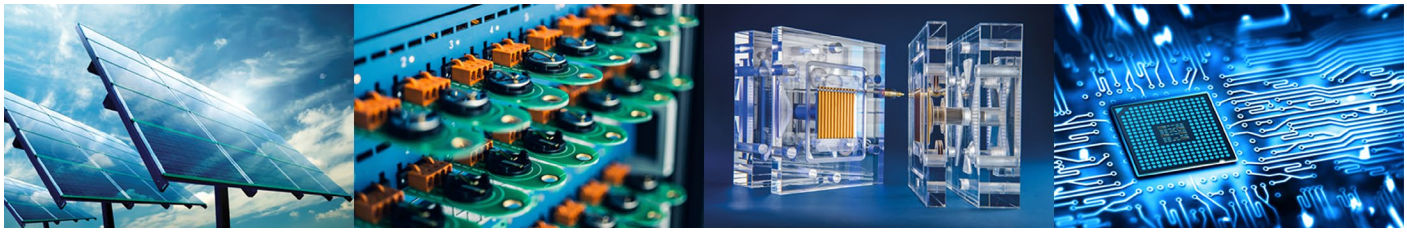
CHM 40616/90616:
Solid-State and Materials Chemistry

Description:
A survey of synthesis, structure (geometric and electronic), spectroscopy, dynamic properties, and reactivity of solid-state compounds of the main group and transition metal elements.



Synopsis:
Extended solids are materials with an infinite array of bonds (e.g., covalent, ionic, or metallic) in at least one dimension. This extended structure is responsible for myriad physical and electronic properties not found in individual molecules or molecular solids. These properties place solid-state materials at the forefront of technologies such as energy capture, storage, and utilization, as well as catalysis, computing and information storage, aeronautics, space exploration, and almost every other aspect of modern life.



This class will entail an introductory discussion of the physical and electronic structure of solid-state materials with an emphasis on structure-property relationships. Methods for materials characterization and applications including energy utilization, catalysis, and optoelectronics will be covered from a practical standpoint.

Selected Topics:

Structure	Characterization	Electronic Properties and Applications
• Bonding • Symmetry • Crystalline structure types • Defects • Hybrid materials • Synthesis methods	• Diffraction • Structure determination • Nuclear spectroscopy • Vibrational spectroscopy • Electronic spectroscopy • Electrochemistry	• Electronic structure • Electronic transport • Applications: LEDs, solar cells, transistors, lasers, batteries, fuel cells, catalysis, magnetism