

## CHM 434F 2017 Syllabus

- Designed as follow-up to CHM 238 Introduction to Inorganic Chemistry with lectures on solid state chemistry basics and CHM 325, Polymer and Materials Chemistry, with lectures on synthesis-structure-property-function relations of selected classes of low dimensional polymeric and inorganic materials.
- In this course we will be concerned with a comprehensive investigation of a wide range of synthetic methods for preparing diverse classes of inorganic materials and nanomaterials with properties and functionality that are intentionally tailored for a particular use.
- The lecture notes begin with a *primer* that covers *key aspects of the background* of solid-state materials and connections between molecules, bonds and molecular orbitals in chemistry and solids, crystal lattices and electronic bands in solid-state chemistry/physics.
- This is followed by a survey of archetype inorganic solids that have had a dramatic influence on the materials world.
- Then a portfolio of strategies for synthesizing and understanding the formation of many different classes of materials and nanomaterials with intentionally designed structures and compositions, dopants, defects, non-stoichiometry, textures and morphologies - length scales and dimensionality are then explored emphasizing how to control relations between structure and property and ultimately functionality and utility.
- A number of *contemporary issues in materials research* are critically evaluated to *introduce the student to recent highlights in the field of materials chemistry and nanochemistry* - emerging sub-disciplines of chemistry.
- REQUIRED TEXT: *L. Smart and E. Moore, Solid State Chemistry, An Introduction, Chapman and Hall, London, Fourth Edition.*
- REFERENCE TEXTS: *A. R. West, Solid State Chemistry and its Applications, Wiley, 2009.* *D. W. Bruce, D. O'Hare, Inorganic Materials, Second Edition, Wiley, 1997.* *L. V. Interrante, M. J. Hampden-Smith, Chemistry of Advanced Materials, Wiley-VCH, 1998.* *C. N. R. Rao, J. Gopalakrishnan, New Directions in Solid State Chemistry, Second Edition, Cambridge University Press, 1997.* *P. Ball, Made to Measure, New Materials for the 21st Century, Princeton University Press, 1997.* *G. A. Ozin, A. Arsenault, L. Cademartiri, Nanochemistry: A Chemical Approach to Nanomaterials, Second Edition, Royal Society of Chemistry, 2009.* *G. A. Ozin, L. Cademartiri, Concepts in Nanochemistry, VCH-Wiley, 2009.*