

School of Chemistry

Aims and Objectives: Session 2022-2023

Module CH5518: Blockbuster Solids

Course Title: Blockbuster Solids

Duration: 20 hours

Lecturer: Dr A. S. Gibbs* and Professor R. E. Morris

(*Module Convener)

Aims: To build on the principles of solid state chemistry introduced in earlier modules, illustrated by examples of important contemporary solids. To understand the factors controlling the functional behaviour of complex solids in terms of solid state structure, composition and chemistry, and to have some understanding of how to design novel solids that might have a particular function.

Objectives:

1. To understand some of the important crystal structure types that occur in inorganic solid state chemistry, particularly the perovskite structure and its derivatives.
2. To understand the key compositional and structural features that control physical properties in various important families of electronically-active inorganic solids: superconductivity in cuprates, magnetoresistance in manganites and ferroelectricity in titanates, for example.
3. To appreciate the role of crystallographic symmetry in controlling certain physical properties of solids.
4. To understand how crystallographic techniques are used in the detailed characterisation of these functional materials, in particular advanced applications of X-ray and neutron powder diffraction.
5. To understand how porous solids are important for many different chemical applications.
6. To develop an understanding of how the structure of porous solids is important for applications in ion exchange, catalysis, separations and medicine.
7. To appreciate how the scale and size of pores affects features such as transport and storage properties.
8. To understand how modern porous materials have the potential to impact many areas in the future, and how the chemistry of the porous materials is vital to full realisation of new solids.