School of Chemistry

Aims and Objectives: Session 2022-2023

Module CH3513: Chemistry of Materials

Duration: 15 hours

Lecturer: Dr R. T. Baker and Dr P. A. Connor*

(*Module Convenor)

Aims: To have a deeper understanding of the formation of solid materials and how microstructures and defects influence properties of the materials. To be able to understand the formation of phase diagrams and know how to extract useful information from them. To recognise the overlying effects of phase transformation kinetics on microstructure. To understand semiconductor band theory and the main processes of integrated circuit manufacture.

Objectives:

1. To know and be able to define what is a solid-state material, and be able to identify some materials and their uses. To know how the materials can be made by standard methods such as solid state, solution and hydrothermal synthesis.

2. To understand the processes involved when sintering materials and the microstructures formed. To have some knowledge of the types of macroscopic defects. To have an understanding of the effect on the physical properties of materials caused by these defects.

3. To be able to interpret binary phase diagrams, and know the constituent parts of a phase diagram. To be able to use the lever rule to calculate the composition at any point of a binary phase diagram. To be able to read off the composition from the ternary phase diagram.

4. To have some knowledge of the kinetics of phase transformations of solid materials. To recognise the various microstructures formed by different phase transformations and the effect it has on the properties of the materials.

5. To have a good understanding of semiconductor theory and properties.

6. To have good knowledge and understanding of the main physical and chemical processes used in the microelectronics industry to manufacture integrated circuits (ICs) and to understand the special demands of precision and control placed on these by the nano-engineered nature of modern ICs.