

**School of Chemistry**  
**Aims and Objectives: Session 2022-2023**  
**Module CH5717: Nanostructured Materials**

**Duration:** 20 hours

**Lecturers:** Professor M. Buck and Professor W. Zhou\*

(\*Module Convenor)

**Aims:** To introduce the concepts and science behind the design and synthesis of a wide range of nanostructures and the application of these structures in functional materials and devices. The relationship between nanoscale structure and composition and macroscale properties and behaviour will be emphasised.

**Objectives:**

1. To become acquainted with the idea of nanoscience and nanotechnology.
2. To understand basic principles of nanoscience and learn how chemical, optical and electronic properties of materials are affected by a change in dimensions.
3. To classify the nanomaterials and nanostructured materials in terms of their number of dimensions: clusters, nanoparticles and quantum dots (0-D); nanotubes, nanowires and nanorods (1-D); nanosheets and films (2-D); and porous crystals, mesoporous structures and metal-organic frameworks (3-D). To understand structures of carbon particles, including fullerenes, diamondoids, nanotubes and graphene films.
4. To learn about basic methods for the synthesis of nanomaterials and generation of nanostructured materials involving top-down and bottom-up strategies.
5. To understand the principles of characterisation and manipulation techniques for nanomaterials, such as SEM, TEM, AFM, STM.
6. To learn about applications related to nanotechnology in sensing, electronic or optical devices, healthcare, and catalysis.
7. To raise awareness of the health and safety issues related to nanomaterials.