UNIVERSITY of BRADFORD

Module Descriptor

Module Details	
Module Title	Materials in Electronics
Module Code	CFS7024-B
Academic Year	2022/3
Credits	20
School	School of Chemistry and Biosciences
FHEQ Level	FHEQ Level 7

Contact Hours	
Type	Hours
Seminars	6
Lectures	28
Directed Study	166

Availability	
Occurrence	Location / Period
BDA	University of Bradford / Semester 2

Module Aims

This module will introduce you to the electronic nature of materials. No previous knowledge of the electronic nature of materials is assumed but a good background in core inorganic and physical chemistry, especially that of bonding is essential. The purpose of the module is to provide students with a good background and appreciation of how the theories of chemical bonding within solids can be used to understand their inherent electronic structure. The content of this module is designed to impart a greater understanding and appreciation for how the properties of the many materials in the world around us can be accounted for.

Outline Syllabus

1. The chemical bond revisited.2. Metallic bonding3. Alloys and non-crystalline metals4. Bands in ionic and covalent solids5. Semiconductors6. Optical transitions in the solid state7. The electronic nature of the solid/liquid junction8. Charge transfer at the solid/liquid junction9. The electrochemical nature of interfaces10. Use of electromagnetic radiation to probe the nature of interfaces

Learning Outcomes	
Outcome Number	Description
01	Analyse the differences in the underlying electronic composition of the main classes of materials.
02	Appraise the main factors that contribute to the nature of the chemical bond.
03	Discuss the models employed to describe the underlying electronic nature of metals especially with respect to their charge transport.
04	Apply the knowledge introduced for metals so as to extend the models to describe the electronic nature of metals to account for the nature of other metallic materials e.g. alloys.
05	Highlight the important aspects of band theory that are employed to explain many of the properties observed by materials in the solid state.
06	Prioritise and discuss the properties of these materials with respect to their use in a variety of relevant device architectures.
07	Explain the role that the solid/liquid interface plays in the attenuation of charge transfer.
08	Explain the role of semiconducting materials play in charge transfer and evaluate the role that that mechanism of charge transport through the extended solid plays in their efficiency.
09	Elaborate on the nature of the solid/liquid interface and the role that it plays in optoelectronic applications.
10	Deduce the effectiveness of various instrumentation and their associated techniques in the elucidation of many of the processes occurring at interfaces and the interpretation of the data so obtained.
11	Converse using the language of material science and be able to communicate with chemists, physicists and engineers in the area using the appropriate concepts.
12	Be competent at self-study and be able to quickly assimilate information.
13	Be able to think across your own discipline and explore other fields.

Learning, Teaching and Assessment Strategy
Assessment 1: An assessed problem based workshop Assessment 2: A summative examination

Mode of Assessment			
Type	Method	Description	Weighting
Summative	Coursework	Problem based workshop (2000 words)	40%
Summative	Examination - Closed Book	Two hour closed book written examination (2 Hrs)	60%

Reading List
To access the reading list for this module, please visit https://bradford.rl.talis.com/index.html

Please note:
This module descriptor has been published in advance of the academic year to which it applies. Every effort has been made to ensure that the information is accurate at the time of publication, but minor changes may occur given the interval between publishing and commencement of teaching. Upon commencement of the module, students will receive a handbook with further detail about the module and any changes will be discussed and/or communicated at this point.

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