

Advanced Materials Chemistry

2 units (selection)

Yoshihiko Tezuka · ASSOCIATE PROFESSOR / OPTICAL MATERIALS AND DEVICES, OPTICAL SYSTEMS ENGINEERING, SYSTEMS INNOVATION ENGINEERING

Target) This course intends to develop the knowledge of materials in physics, chemistry, crystallography, polymer, and semiconductors, which has been acquired in undergraduate, through the rearrangement of these knowledge in terms of the electronic states, constituting atoms and molecules, and interactions between them. The objective of the course is to develop ability to understand materials from the viewpoints of various fields.

Outline) Structures, properties, functions and synthesis of various materials will be explained in term of chemistry to understand materials chemistry which constitutes one of the bases of materials science. Fullerenes and their derivatives will be taken up as recent topics to explain the relationship between molecular structures and physical properties.

Goal

1. to enable a student to develop applications of materials by the estimation of their properties from the atoms and molecules constituting them.
2. to enable a student to develop applications of materials by the estimation of their electric and electronic properties from the electronic states.

Schedule

1. Introduction to materials and chemistry
2. Classification of materials according to their crystalline states and molecular aggregation states
3. Crystalline materials
4. Amorphous materials (glass, silicone, metals)
5. Molecular aggregate (micelle, liquid crystalline, gels)
6. Classification of materials according to their electronic states
7. Experimental methods for the evaluation of electric properties of materials
8. Dielectric materials (1): ceramics
9. Dielectric materials (2): polymers
10. Electrochemical properties of semiconductors (1): inorganic semiconductors
11. Electrochemical properties of semiconductors (2): organic semiconductors
12. Electronic interactions between metals and semiconductors
13. Electronic interactions between semiconductors and redox species in solutions
14. Carbon materials: molecular structures and electronic states of fullerenes
15. Carbon nanotubes
16. A term examination

Evaluation Criteria) Reports worth a total of 50% of the course grade will be given. A term examination (50%) will be given as in-class closed-book examination.

Textbook) will be introduced in the lecture.

Contents) <http://cms.db.tokushima-u.ac.jp/cgi-bin/toURL?EID=216859>

Contact

⇒ Tezuka (Opt.307, +81-88-656-9423, ytezuka@opt.tokushima-u.ac.jp) MAIL