Course Title and credit:
Molecular Functional Materials , 2

Appropriate grade level and Eligible Departments:
1st-5th grades

Lecturer(s):
Masahiro Hiramoto (ext. 5537, hiramoto@ims.ac.jp)
Toshikazu Nakamura (ext. 7381, t-nk@ims.ac.jp)

Schedule: 5/12,19,26,6/2,9,16,23

Place:
Nakamura （5/12, 19, 26, 6/23(PM)）
Research Office Building 301, Myodaiji-Campus
Hiramoto （6/2, 9, 16 , 6/23 (AM)）
seminar room, Building3, 2rd Floor , Yamate-Campus

Prerequisites and Styles:
Writing and explaining on black board, and partially using power-point files and a projector (Hiramoto)
Writing and explaining on black board, and partially using power-point files and a projector (Nakamura)

Course objectives:
(1) Although plastics are well known as typical insulators, they show electric conductivity by chemical oxidation (reduction). Such kinds of materials are called as "Conducting Molecular-based Materials" or simply "Organic Conductors". The discovery of them was half-century old, and a lot of superconductors have been developed so far. Organic conductors attract much attention because of their curious phenomena, which are originated from 1) anisotropic low-dimensional electronic states, 2) strong electronic correlations, and 3) considerable coupling between conduction electron and internal molecule freedom. In this lecture, physical properties and background of "Organic Conductors" are introduced.

(2) Understanding photo-electric properties of organic semiconductors and their application to organic devices

Contents:

(1) Chap. 1 Low-dimensional conductors
Chap. 2 Organic conductors and their electronic states
Chap. 3 Peierls transition
Chap. 4 Dynamics of density-wave
Chap. 5 Coulomb correlation and magnetism
Chap. 6 Superconductivity
Chap. 7 Recent topics of organic conductors and perspective

(2) Chapter 1 Organic EL devices
Chapter 2 Organic field-effect transistors
Chapter 3 Organic solar cells
Chapter 4 Organic photoreceptors
Chapter 5 Photo-electrical properties of organic semiconductors,
Chapter 6 Organic/Metal Interfaces

Lecture materials and readings:

Grades:

Minimum score of 60 % is needed for obtaining the credit. Judgment will be made on the basis of the attendance record and some assignments.