

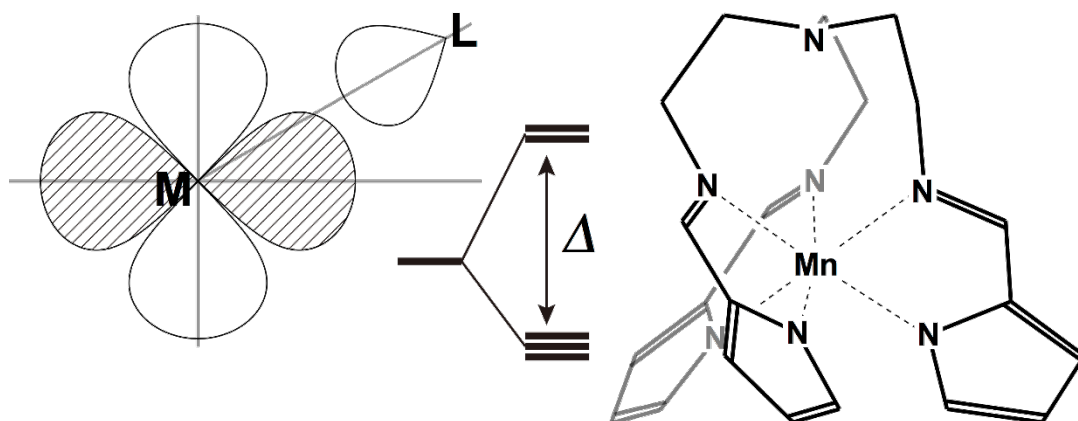


## Ligand Field Calculations without Group Theory

### Abstract:

Transition metal complexes show beautiful colors, interesting magnetisms, useful catalysis, and other functional characteristics, arising from partially occupied d-orbitals of metal ion. In order to understand those compounds, d-orbital energy levels (known as ligand-field splitting) are essential. Although many textbooks explain the energy level splitting of d-orbitals in *regular* octahedral or tetrahedral coordination with group theoretical discussions, not all the metal complexes have such high symmetries in fact. In this lecture, *Angular Overlap Model* (AOM) for ligand field is accounted for, where ligand field contribution from each ligand are simply summed up, that is, the AOM requires no symmetry specification for coordination geometry and allows to calculate lower-symmetry complexes.

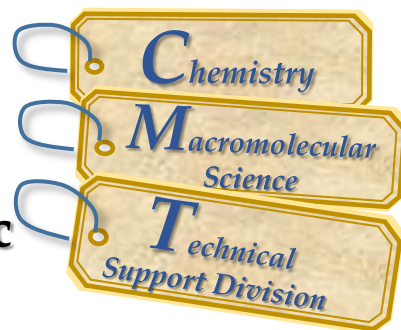
PC demonstration using a FORTRAN code covers a Walsh diagram along a molecular deformation from square-planar to tetrahedral geometries, ligand-field dependence of multiplet energies of an octahedral complex (Tanabe-Sugano diagram), magnetization change under a uniaxial deformation from compressed to elongated octahedrons, Zeeman splitting of spin levels under a magnetic field applied, and so on.



**Lecturer:** Motohiro NAKANO

# Chemistry 2

Day 4, July 16, 10am-12pm



## Measurement of Nuclear Magnetic Resonance & Remote Operation

### Abstract:

In this lecture, we virtually provides hands-on training in analytical methods of NMR, as well as didactic training in the fundamental principles of the techniques. We have just launched new programs that aims to allow the remote operation of our available instruments by students and researchers from overseas. This initiative seeks to address the restrictions imposed on research activities by the unavailability of advanced instrumentation, particularly on developing countries. [https://www.sci.osaka-u.ac.jp/en/news/2540\\_1/](https://www.sci.osaka-u.ac.jp/en/news/2540_1/)



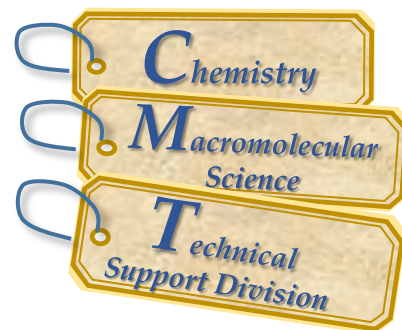
**Lecturer:** *Dr. Shinya Hanashima*



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# Chemistry 3

Day 6, July 20, 1:30-3:00pm



## X-ray Crystallographic Analysis & Remote Operation

### Abstract:

In this lecture, we virtually provides hands-on training in analytical methods of X-ray crystallographic analysis, as well as didactic training in the fundamental principles of the techniques. We have just launched new programs that aims to allow the remote operation of our available instruments by students and researchers from overseas. This initiative seeks to address the restrictions imposed on research activities by the unavailability of advanced instrumentation, particularly on developing countries. [https://www.sci.osaka-u.ac.jp/en/news/2540\\_1/](https://www.sci.osaka-u.ac.jp/en/news/2540_1/)



**Lecturer:** *Dr. Anas Santria*



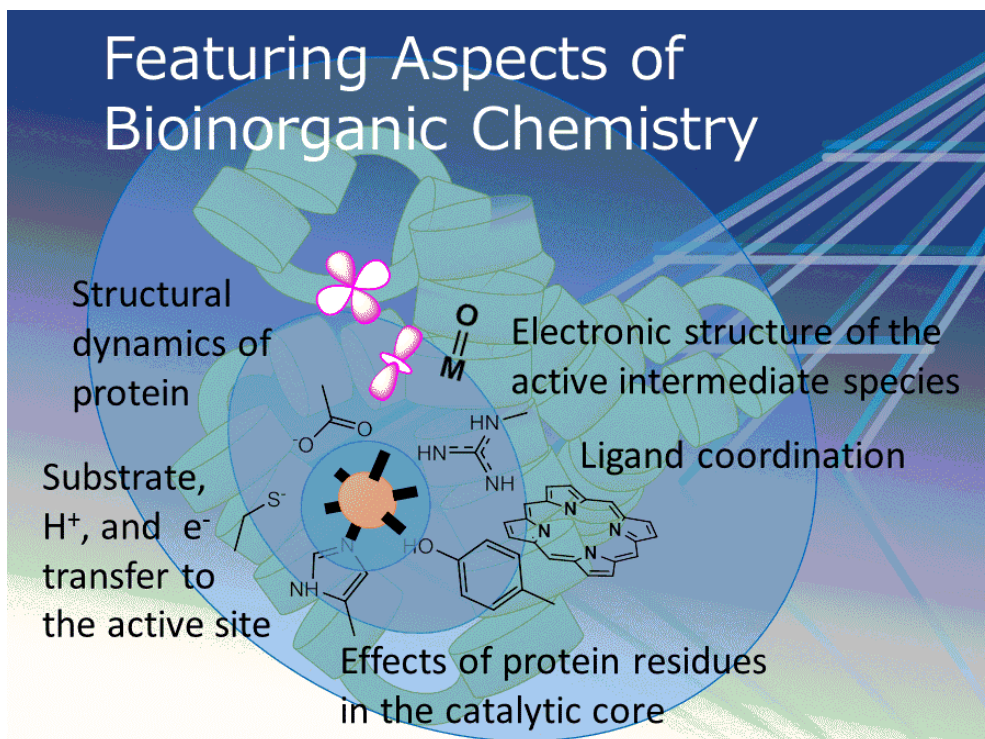
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## Inorganic Aspects in Biological Systems

### Abstract:

Surprisingly, the term of "Inorganic Chemistry" literally means the chemistry of "non-living or non-biological" compounds. Nowadays, such the classification had become incorrect. This lecture will be mainly given on metalloproteins including metals at the active sites to understand their structures, functions, and chemical and mechanistic properties. The metal ions are Lewis acid catalysts in hydrolysis, and frequently show various oxidation states upon electron transfer and redox reaction. These chemical properties of metal centers can be fundamentally controlled by coordination structures at the active sites. In the protein environments, the proximal and distal amino acid residues strongly assist the functions of the active metal centers.



**Lecturer:** Prof. Yasuhiro Funahashi



# Chemistry Other Contents

Archived videos



## Introduction of Chemistry Department

### YouTube

[https://youtube.com/playlist?list=PLc\\_iv2yo6EPCOonqXbellEvdM4eERPIfY](https://youtube.com/playlist?list=PLc_iv2yo6EPCOonqXbellEvdM4eERPIfY)

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#### 2) Introduction of Chemistry Department 2

<https://echo360.net.au/media/1f6cb638-5420-41ff-9653-a2d1f09fc0f6/public>

#### 3) Study aboard to Chemistry Department

<https://echo360.net.au/media/95f09b72-3282-4fd9-8f20-f50fbdc484ce/public>

#### 4) Fukase Lab

<https://echo360.net.au/media/d15e8373-6dff-49ba-b668-21e853a390ea/public>

#### 5) Hojo Lab

<https://echo360.net.au/media/36850d9b-6244-4d48-a732-aede844ec96d/public>

#### 6) Tsukahara Lab

<https://echo360.net.au/media/76a17e8d-cc96-4844-aa4b-67bc3aef575a/public>

#### 7) Nakatani Lab

[https://www.youtube.com/watch?v=TbNc1PfqIrs&list=PLc\\_iv2yo6EPCOonqXbellEvdM4eERPIfY&index=4&t=27s](https://www.youtube.com/watch?v=TbNc1PfqIrs&list=PLc_iv2yo6EPCOonqXbellEvdM4eERPIfY&index=4&t=27s)

#### 8) Suzuki Lab

[https://www.youtube.com/watch?v=AbYIwTajmIU&list=PLc\\_iv2yo6EPCOonqXbellEvdM4eERPIfY&index=5](https://www.youtube.com/watch?v=AbYIwTajmIU&list=PLc_iv2yo6EPCOonqXbellEvdM4eERPIfY&index=5)



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