

Title Synthesis of metal complexes aimed at reversible conversion between chemical energy and electrical one**Speaker** Dr. Koji TANAKA
Research Professor
Institute for Integrated Cell-Material Sciences
Kyoto University**Date & Time** Friday, July 27, 2012 4:00 p.m.**Place** INAMORI Hall, Ito campus, Kyushu University**Abstract**

Material cycles coupled with energy conversions catalyzed by various biological enzymes keep global environments. On the contrary, industrialization relying on huge consumptions of natural resources inevitably has caused serious energy shortages and environmental damages. At present, great efforts have been paid to power generation and hydrogen production without using fossil fuels. Stable redox reactions of metal ions are widely utilized in electric power storages. However, reversible transformation between small inorganic and organic molecules driven by redox reactions would be much more suitable in energy conversion reactions from the viewpoints of energy densities per molecular weights and hazardous nature of hydrogen. The most serious issue in energy conversion from natural energy to chemical one is that stable molecular-transformations take place through at least two-electron migrations. On the other hand, intermolecular electron transfer is basically one-electron process. Repeated one-electron transfer aimed at multi-electron redox reactions requires to cross high-energy barriers, and the resultant high reactive radical intermediates often cause undesirable side-reactions. Taking into account that proton coupled electron transfer in redox reactions of organic molecules would effectively decrease in energy-barrier, metal complexes that undergo proton coupled electron transfer are suitable candidates to catalyze smooth molecular transformation through redox reactions. We propose combination of the transformation between CO₂ and CH₃OH through six-electron redox reaction, and between H₂O and O₂ driven by four-electron redox one as the most feasible processes to construct material circulation coupled with energy conversion catalyzed by metal complexes. Along this line, we have prepared metal complexes bearing oxyl- and aminyl-radicals to oxidize CH₃OH and water, and having an NAD model ligands to catalyze multi-electron reduction of CO₂.

About the Speaker

Dr. Koji Tanaka received his Ph.D. degree from Osaka University in 1975. After he graduated from Master course of graduate school Osaka University in 1971, he was employed as an assistant professor, Osaka University. He worked at Prof. R. B. King's laboratory in Georgia University USA as a visiting scholar for 1 year in 1978. In 1990, he moved to Institute for Molecular Science (IMS) as a professor. After retirement from IMS at the end of March, 2012, he joined as a research professor at Institute for Integrated Cell-Material Sciences, Kyoto University in April.

He has been working on synthesis of metal complexes aimed to catalyze reduction of CO₂ and proton, and also oxidation of water and alcohols. Through these studies, his current research focuses on reversible conversion between chemical energy and electrical one to build a sustainable society.

Host: Professor Yoshinori NARUTAFor registration, please visit our website :<http://i2cner.kyushu-u.ac.jp/>CONTACT: Research Support and International Affairs division
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