Yasuhiko YUKAWA, Ph.D.

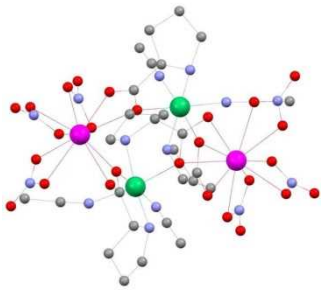
Professor
Program: Environmental Science and Technology
Area: Natural Environmental Science
Undergraduate: Dept. of Environmental Science

Professional Expertise

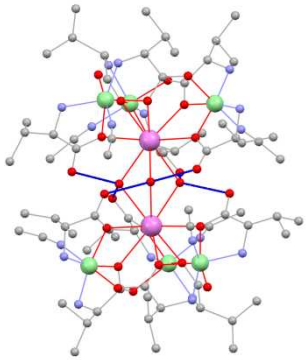
His professional expertise encompasses green chemical synthesis, structure, and properties of heteronuclear complexes. He and his group have been carrying out the syntheses of poly- and/or hetero-nuclear complexes bridged by amino acidato ligands, determining their structures by means of X-ray crystallography, and investigating their properties, especially electrochemical and magnetic.

Research Fields of Interest

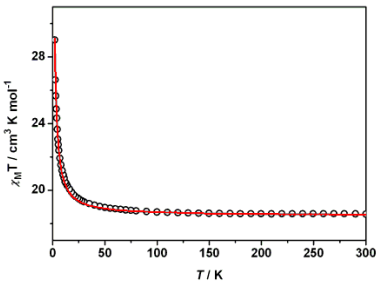
The metal complexes of amino acids interest biochemists as models for the metal-binding sites on proteins. From the point of view of coordination chemistry, an amino acid, which is safe and easily obtained, i.e. amino acid is a green chemical material, can be regarded as a typical multidentate ligand. Taking advantage of the properties of the amino acid ligand, he and his group have been carrying out the syntheses of heteronuclear complexes bridged by amino acidato ligands. Heteronuclear complexes have attracted special attention because of their versatile magnetic behavior, as well as being single molecule magnets, derived from large ground spin state and large magnetic anisotropy. Moreover, the heteronuclear complexes are very interesting and useful compounds for their versatile multistep redox behavior derived from variation of oxidation state of each metal. Polynuclear complexes containing transition metals are suitable materials to construct multistep redox systems. His group's work involves the synthesis and study of polynuclear metal complexes which may act as single molecule magnets and molecule condenser. His group has made such complexes with the metals from lanthanide to transition metals, such as iron, cobalt, nickel, and copper, with the large containing more than twelve metal centers. Their magnetic properties are also exciting, and are studied in collaboration with groups from United Kingdom, and Spain.



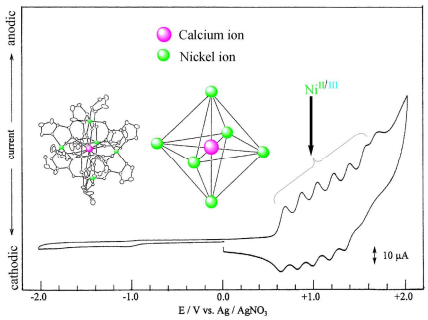
$[\{Ln_2\{Ni(pro)_2\}_2(NO_3)_6(CH_3CN)_2$



$[\{Ln_2(\mu\text{-}OH_2)_3\}\{Ni(val)_2\}_6]^{6+}$



Susceptibility studies of
$[\{Ln_2\{Ni(pro)_2\}_2(NO_3)_6(CH_3CN)_2]$



Cyclic Voltammogram of
$[Ca\{Ni(pro)_2\}_6]^{2+}$

Education

1984: Ph.D. in Chemistry, Graduate School of Science and Technology, Sophia University, Japan
1981: M.S. in Chemistry, Graduate School of Science and Technology, Sophia University, Japan
1979: B.S. in Chemistry, College of Science and Technology, Sophia University, Japan

Professional Societies and Activities

1. Chemical Society of Japan, Fellow
2. Japan Society of Coordination Chemistry, Fellow
3. American Chemical Society, Fellow

Major Publications

Papers

[1] "Synthesis, structure, DNA-binding, and nuclease activity of a 3d–4f mixed metal nitrosyl complex", *Journal of Coordination Chemistry, 2012, 65(19), 3469-3480.*

[2] "A molecular pair of [GdNi3] tetrahedral bridged by water molecules," *Chemistry A European Journal, 2011, 17, 8264-8268.*

[3] "Low-frequency spin dynamics and NMR spin-lattice relaxation in antiferromagnetic rings," *Physical Review B, 2011, 83, 014404-1-5.*

[4] "A cyclic tetranuclear Ni2Gd2 complex bridged by amino acidato ligands, with an S = 9 ground state, derived from ferromagnetic spin-coupling between nickel(II) and gadolinium(III) ions," *Dalton Transactions, 2009, 3140-3142.*

[5]"Study of the magnetic exhange within the cluster polymer [NaCu6(gly)8(ClO4)3(H2O)]n(ClO4)2n," *Inorganica Chimica Acta, 2008, 361, 3919-3925.*

[6]"Synthesis of polynuclear complexes with an amino acid or a peptide as a bridging ligand," *Current Chemical Biology, 2008, 2, 122-139-8268.*

[7]"Low energy excitations in molecular antiferromagnetic rings, Fe10 and Fe12," *Journal of Magnetism and Magnetic Materials, 2007, 310, 1441-1443.*

[8]"High Field EPR and Magnetic Studies of Exchange-Coupled Octahedral Lanthanide Centered [GdNi6] and [LnNi6] Clusters," *Angew. Chem. Int. Ed., 2005, 44, 1997-2001*