

# 酸化状態制御による合目的金属間相互作用を有する 集合型多核金属錯体の開発

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雑誌名	平成9(1997)年度 科学研究費補助金 基盤研究(C) 研究成果報告書概要
巻	1996 1997
ページ	3p.
発行年	1999-03-15
URL	<a href="http://doi.org/10.24517/00066121">http://doi.org/10.24517/00066121</a>



# 1997 Fiscal Year Final Research Report Summary

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## Development of Integrated Multinuclear Transition Metal Complexes with Novel Properties

Research Project

### Project/Area Number

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08640707

### Research Category

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Grant-in-Aid for Scientific Research (C)

### Allocation Type

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Single-year Grants

### Section

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一般

### Research Field

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Inorganic chemistry

### Research Institution

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Faculty of Science, Kanazawa University

### Principal Investigator

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### Project Period (FY)

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1996 – 1997

### Keywords

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Dinuclear Cobalt Complexes / Dinuclear Iron Complexes / Dinuclear Nickel Complexes / Tetranuclear Iron Complexes / Molecular Oxygen Complexes / Dinuclear Zink Complexes / Magnetic Interaction

## Research Abstract

(1) Development of Novel Dinuclear Iron (II) and Cobalt (II) Complexes Which Can Reversibly Add Molecular Oxygen as a Model of Iron Protein : We succeeded in preparing the first dinuclear iron complex  $[\text{Fe}_2(\text{Ph-bimp})(\text{C}_6\text{H}_5\text{COO})(\text{O}_2)]^{2+}$  which can reversibly add molecular oxygen. The complex was noticed worldwide. Di- $\mu$ -superoxo dinuclear cobalt complex  $[(\text{Me}_3\text{tacn})_2\text{CO}^{III}(\mu\text{-OH})(\mu\text{-O}_2)]^{3+}$  was newly prepared, which is characteristic in that it contains two bridging superoxo groups.

(2) Preparation of Copper (I) Complexes Which Can Absorb Oxygen and Catalytically Oxidizing Abilities Thereof :  $[\text{Cu}(\text{N}_4\text{-Me}_3\text{py})]^+$  was reacted with molecular oxygen, and the a  $\text{CH}_3$  - group of the ligand was oxidized to  $-\text{COOH}$ .  $[\text{Cr}(\text{H}_2\text{O})(\text{tpa})]^+$  was found to be a good catalyst for reducing  $\text{NO}_2$  to  $\text{N}_2\text{O}$ .

(3) Preparation of Dinuclear Chromium (III,III) -, Dinuclear Chromium (III) -Nickel (II) -, and Trinuclear Nickel (II,II) -Chromium (O) Complexes ; Metal-Metal Superexchange Interaction, and Development of Molecular Magnets :  $[(\text{phen})_2\text{Cr}(\text{OH})_2\text{Ni}(\text{L}_2)]^{3+}$  ( $\text{L}_2$  : 2,2,2-tet, 3,2,3-tet, cyclen, tpa, Me-tpa, and Me<sub>2</sub>-tpa) were synthesized, and investigated the magnetic interaction between nickel (II) and chromium (III) ions. In the present stage, we could not prepare an ideal molecular magnet. However, the results here will be a good direction for developing a molecular magnet.


(4) Preparation of Nickel (II) Complexes as Model of Urease :  $[\text{Ni}_2(\text{Me}_4\text{-tpdp})(\text{CH}_3\text{COO})(\text{ClO}_4)(\text{CH}_3\text{OH})]^+$  and  $[\text{Ni}_2(\text{Me}_4\text{-tpdp})(\text{CH}_3\text{COO})(\text{urea})]^{2+}$  were newly prepared and the structure was analyzed. The complexes will be a good model of urease.


(5) Development of Dinuclear Zink (II,II) complexes as a Model of Phosphoesterase :  $[\text{Zn}_2(\text{Me}_4\text{-tpdp})(\text{HOCO})]^{2+}$ ,  $[\text{Zn}_2(\text{Me}_4\text{-tpdp})(\text{CH}_3\text{OCOO})]^{2+}$ ,  $[\text{Zn}_2(\text{Me}_4\text{-tpdp})(\text{OH}_2)]^{3+}$ , and  $[\text{Zn}_2(\text{Me}_4\text{-tpdp})(\text{OH}_2)]^{2+}$  were newly prepared, which will be a good model of phosphatase.


## Research Products (16 results)


All Other


All Publications (16 results)


[Publications] T.Ookubo, H.Sugimoto, T.Nagayama, H.Masuda, T.Sato, K.Tanaka, Y.Maeda, H.Ohokawa, Y.Hayashi, A.Uehara, & M.Suzuki: "Cis-1,2- $\mu$ -Peroxo Diiron Complex : Structure and Reversible Oxygenation" J.Am.Chem.Soc.118.3. 701-702 (1996) 


[Publications] T.Kayatani, Y.Hayashi, M.Suzuki, K.Inomata, & A.Uehara: "Coordination Asymmetry of a Dinuclear Copper (II) Complex : Synthesis, Structure, and Magnetism" Bull.Chem.Soc.Jpn.69.2. 389-397 (1996) 


[Publications] H.Sugimoto, Y.Hayashi, C.Koshi, S.Fujinami, M.Suzuki, Y.Maeda, & A.Uehara: "Formation of a Tetranuclear High-Spin Iron (II,III,II,III) Mixed Valence Complex" Chem.Lett.1996 · 10. 933-934 (1996) 


[Publications] K.Yamaguchi, S.Koshino, M.Suzuki, A.Uehara, & S.Suzuki: "Structures and Catalytic Activities of Carboxylate-bridged Dinickel (II) Complexes as Models for the Metal Center of Urease" J.Am.Chem.Soc.119 · 24. 5752-5753 (1997) 


[Publications] H.Hayashi, S.Fujinami, M.Suzuki, K.Tanaka, & A. Uehara: "Dioxygen-Reactivity of a Copper (I) Complex with Tris (6-methyl-2-pyridylmethyl) amine" J.Inorg.Biochem.67 · 1~4. 66- (1997) 


[Publications] Y.Hayashi, M.Obata, M.Suzuki, & A.Uehara: "Synthesis and Properties of Di- $\mu$ -superoxo Dinuclear Cobalt (II,III) Complex" Chem.Lett.1997 · 12. 1255-1256 (1997) 

[Publications] N.Kmeda, H.Nagao, Y.Kushi, G.Adachi, M.Suzuki, A.Uehara, and K.Tanaka: "Molecular Structure of Nitro- and Nitrito-Copper Complexes as Reaction Intermediates in Electro-chemical Reduction of Nitrite to Dinitrogen Oxide" Bull.Chem.Soc.Jpn.68, No.2. 581-589 (1995) 

[Publications] Y.Hayashi, T.Kayatani, H.Sugimoto, M.Suzuki, K.Inomata, A.Uehara, Y.Mizutani, T.Kitagawa, and Y.Maeda: "Synthesis, Characterization, and Reversible Oxygenation of  $\mu$ -Alkoxo diiron (II) Complexes with a Dinucleating Ligand, N,N,N', N'-Tetrakis {2-(6-methylpyridyl) methyl} -1,3-diaminopropane-2-olate" J.Am.Chem.Soc.117, No.45. 11220-11229 (1995) 

[Publications] T.Ookubo, H.Sugimoto, T.Nagayama, H.Masuda, T.Sato, K.Tanaka, Y.Maeda, H.Ohokawa, Y.Hayashi, A.Uehara, and M.Suzuki: "Cis-1,2- $\mu$ -Peroxo Diiron Complex : Structure and Reversible Oxygenation." J.Am.Chem.Soc.118, No.3. 701-702 (1996) 

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[Publications] H.Hayashi, S.Fujinami, M.Suzuki, K.Tanaka, and A.Uehara: "Dioxygen-Reactivity of a Copper (I) Complex with Tris (6-methyl-2-pyridyl-methyl) amine" J.Inorg.Biochem.67, No.1-4. 66 (1997) ▼

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[Publications] Y.Hayashi, M.Obata, M.Suzuki, and A.Uehara: "Synthesis and Properties of Di- $\mu$ -superoxo Dinuclear Cobalt (II,III) Complex" Chem.Lett.No.12. 1255-1256 (1997) ▼

[Publications] M.Suzuki, S.Fujinami, T.Hibino, H.Hori, Y.Maeda, A.Uehara, and M.Suzuki: "Synthesis and Characterization of Mixed Valence  $\mu$ -Alkoxodiiron (II,III) Complexes with an Unsymmetric Dinucleating Ligand." Inorg.Chim.Acta. (submitted). ▼

**URL:** [https://kaken.nii.ac.jp/report/KAKENHI-PROJECT-08640707/086407071997kenkyu\\_seika\\_hokoku\\_](https://kaken.nii.ac.jp/report/KAKENHI-PROJECT-08640707/086407071997kenkyu_seika_hokoku_)

Published: 1999-03-15