



Tadaaki IKOMA, Dr. Sci.

Professor

Program: Fundamental Sciences

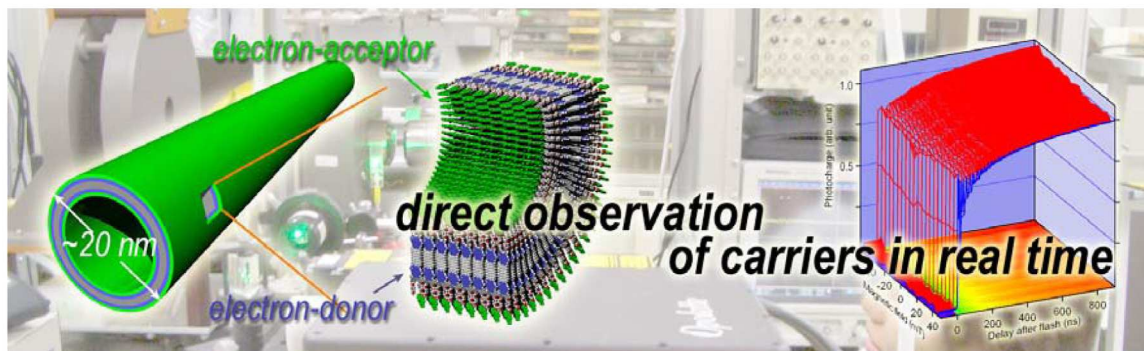
Area: Chemistry

Undergraduate: Dept. of Chemistry

<http://chem.sc.niigata-u.ac.jp/~ikoma/>

Professional Expertise

Ikoma laboratory researches various electronic functions of molecular nanomaterials and is aiming to clarify the mechanism and to manipulate those functionalities. Orbit, charge and spin of electron play essential roles for the optical, electrical and magnetic properties of materials. One of the fascinating natures of molecular materials is a hierarchic framework of interaction, which the size of interaction decreases in the order of element, molecule and nanostructured object. Based on the idea of interaction hierarchy, we can choose element, design molecular structure and integrate unit molecules. This build-up chemistry has a potential to realize the challenge to create and control the novel multifunction expanded from quantum effects in atoms and molecules. The strong point of his researches is on the elucidation of mechanism for the multifunction especially by means of the molecular spectroscopic measurements and the experiments of the illumination, electric and magnetic field effects on the properties of semiconductors formed by advanced molecular nanomaterials. The achievements of the series of mechanistic studies can contribute to molecular electronics such as organic photovoltaic cell by providing a new concept for enhancing the energy conversion efficiency.



Education

1993: Doctoral Sci. degree, Tohoku University, Japan

Professional Societies and Activities

Tadaaki Ikoma became a Faculty Member of Department of Chemistry in June 2007. In 1993, he received his PhD degree from Tohoku University. In order to elucidate the electronic and molecular structures of many molecules that play important roles in fundamental chemical reactions, Tadaaki continued his research work using time-resolved and pulsed electron spin resonance (ESR) techniques as a Research Associate at Tohoku University (1989-2007). Meanwhile Tadaaki studied impurity levels in a wide bandgap semiconductor using high frequency ESR as a Postdoctoral Research Fellow at Department of Physics, Leiden University

(1996-1997). At 2003 the Society of Electron Spin Science and Technology selected him to receive the Young Investigator Award. He was also a Researcher of PRESTO-JST (Japan Science and Technology Agency) engaged in creation of molecular device with photoinduced giant magnetoresistance from 2006 to 2010.

Awards

Young Investigator Award, the Society of Electron Spin Science and Technology, 2003

Major Publications

- [1] "Giant Magnetoresistance due to Electron-hole Pair Mechanism in Poly(*N*-vinylcarbazole)." T. Ikoma, T. Ogiwara, Y. Takahashi, K. Akiyama S. Tero-Kubota, Y. Takahashi, T. Suzuki and Y. Wakikawa, *Synth. Met.*, 160(3-4), 285-290, 2010
- [2] "Magnetic Field Effect on the Photocarriers in Self-assembled Hexabenzocoronene Nanotubes." Y. Wakikawa, T. Ikoma, Y. Yamamoto, T. Fukushima and T. Aida, *Synth. Met.*, 160(3-4), 275-279, 2010.
- [3] "Peculiarity in the Electronic Structure of Cu(II) Complex Ferromagnetically Coupled with Bisimino Nitroxides." T. Ikoma, H. Oshio, M. Yamamoto, Y. Ohba and M. Nihei, *J. Phys. Chem. A*. 112(37), 8641-8648, 2008.
- [4] "Time-resolved EPR Study on Photoreduction of Sodium Anthraquinone-2-sulfate in Liposomes." S. Moribe, T. Ikoma, K. Akiyama and S. Tero-Kubota, *Chem. Phys. Lett.*, 457, pp.66-68, 2008.
- [5] "Synthesis and Intramolecular Pericyclization of 1-Azulenyl Thioketones." S. Ito, T. Okujima, S. Kikuchi, T. Shoji, N. Morita, T. Asao, T. Ikoma, S. Tero-Kubota, J. Kawakami, and A. Tajiri, *J. Org. Chem.*, 73, 2256-2263, 2008
- [6] "Spin-correlated Radical Pairs in the Synthetic Hairpin DNA." S. Nakajima, K. Akiyama, K. Kawai, T. Takada, T. Ikoma, T. Majima and S. Tero-Kubota, *Chem. Phys. Chem.* 8(4), 507-509, 2007
- [7] "EPR Study on Paramagnetic Species in Nitrogen-doped ZnO Powders Prepared by a Mechanochemical Method." S. Moribe, T. Ikoma, K. Akiyama, Q. Zhang, F. Saito and S. Tero-Kubota, *Chem. Phys. Lett.*, 436, 373-377, 2007
- [8] "Characterization of the Phenoxyl Radical in Model Complexes for the CuB Site of Cytochrome *c* Oxidase: Steady-State and Transient Absorption Measurements, UV Resonance Raman Spectroscopy, EPR Spectroscopy, and DFT Calculations for M-BIAIP." Y. Nagano, J. -G. Liu, Y. Naruta, T. Ikoma, S. Tero-Kubota and T. Kitagawa, *J. Am. Chem. Soc.*, 128(45), 14560-14570, 2006.
- [9] "Visible Light Induced Paramagnetic Sites in Nitrogen-doped TiO₂ Prepared by a Mechanochemical Method." Y. Yamamoto, S. Moribe, T. Ikoma, K. Akiyama, Q. Zhang, F. Saito and S. Tero-Kubota, *Mol. Phys.*, 104, 1733-1737, 2006
- [10] "Evidence of Photocarrier Generation via the Singlet and Triplet States in a Poly(*N*-vinylcarbazole) Film." T. Ikoma, F. Ito, T. Ogiwara, K. Akiyama and S. Tero-Kubota, *Chem. Lett.*, 34, 1424-1425, 2005.
- [11] "Preliminary Investigation of Supply of Chemical Species in Aqueous Solution Using Hydrogen-Oxygen Flame." M. Uchida, T. Sogabe, T. Ikoma and A. Okuwaki, *Environ. Sci. Technol.*, 39, 5851-5855, 2005
- [12] "Spin Dynamics of Carrier Generation in a Photoconductive C60-doped Poly(*N*-vinylcarbazole) Film." T. Ogiwara, T. Ikoma, K. Akiyama and S. Tero-Kubota, *Chem. Phys. Lett.*, 411, 378-383, 2005.
- [13] "Dependence of Mechanochemically Induced Decomposition of Mono-chlorobiphenyl on the Occurrence of Radicals." Y. Tanaka, Q. Zhang, F. Saito, T. Ikoma and S. Tero-Kubota, *Chemosphere*, 60, 939-943, 2005.
- [14] "Study of Anisotropic Interfacial Electron Transfer across a Semiconductor/Solution Interface by Time-resolved ESR." K. Akiyama, S. Hashimoto, S. Tojo, T. Ikoma, S. Tero-Kubota and T. Majima, *Angew. Chem. Int. Ed.*, 44, 3591-3594, 2005
- [15] "Carrier Generation in Photoconductive Poly (*N*-vinylcarbazole) as Revealed by Multifrequency Time-resolved ESR." T. Ikoma, K. Akiyama and S. Tero-Kubota, *Phys. Rev. B*, 71, 195206-1-13, 2005
- [16] "Carrier Generation Process on Photoconductive Polymer Films as Studied by Magnetic Field Effects on the Charge-Transfer Fluorescence and Photocurrent." F. Ito, T. Ikoma, K. Akiyama, A. Watanabe and S. Tero-Kubota, *J. Phys. Chem. B*, 109, 8707-8717, 2005 ; 110, 5161-5162, 2006
- [17] "Spin Dynamic Study on the Electric Field Dependence of Carrier Generation." F. Ito, T. Ikoma, K. Akiyama and S. Tero-Kubota, *J. Phys. Chem. B*, 109, 7208-7213, 2005