

Institute Lecture

Frontier of Quantum Molecular Spintronics Based on Single-Molecule Magnets: Toward Green IT devices



Prof. Masahiro Yamashita
Tohoku University, Japan

Saturday, 5th April 2014, Time: 9.30 AM,
Venue: Outreach Auditorium

Abstract

Spintronics is a key technology in 21st century based on the freedoms of the charge, spin, as well as orbital of the electron. The MRAM systems (magnetic random access memory) by using Giant Magnetoresistance (GMR) or Tunneling Magnetoresistance (TMR) have several advantages such as no volatility of information, the high operation speed of nanoseconds, the high information memory storage density, and the low consuming electric power. Usually in these systems, the bulk or classical magnets composed of the transition metal ions are used, while in our study we will use Single-Molecule Magnets (SMMs). In the lecture, we will focus on the new quantum molecular spintronics by using SMMs as follows; 1) Single-molecule memory by Kondo peaks, 2) Field effect transistor of SMMs, 3) GMR (~200 %) of SMMs, 4) TMR with double butterfly and 5) Concept of DNA quantum computer.

[1] T. Komeda, M. Yamashita, et al., Nature Commun., 2, 217 (2011)

About the speaker

Prof. Masahiro Yamashita finished his Ph.D from Kyushu University in 1982. After a year of postdoctoral work at Institute for Molecular Science, he joined Kyushu University as an Assistant Professor in 1983. He became an Associate Professor at Nagoya University in 1987 and then gets promoted as a full Professor in 1998. In 1999, he moved to Tokyo Metropolitan University as a Professor. From 2004 he is at Tohoku University where he is a Professor and the head of laboratory of coordination chemistry. He was a visiting Professor at University College London and Institute for Molecular Science, Japan. From 2007 onwards, he is a concurrent Professor at Nanjing University (China), Zhenjiang University (China) and Cagliari University (Italy).

Prof. Masahiro Yamashita received several awards, which include Award of Inoue Scientific Foundation in 2002 and The Chemical Society of Japan Award for Creative Work in 2005. He was the Vice-President of Japan Society of Coordination Chemistry (2006-2007) and the Chairman of Chemistry Department, Tohoku University (2009-2010). He is currently the Chairman of Asian Conference on Coordination Chemistry, a member of Science Council of Japan, a member of International Advisory Committee of Korean Basic Science Institute, an Advisory Board Member of Inorganic Chemistry (ACS), in the Editorial Board of Polyhedron and a Council Member of Tohoku University. He is one of the Associate Editors of Dalton Transactions (RSC).

Prof. Masahiro Yamashita's research interest includes Multi-Functional Nano-Sciences of Advanced Metal Complexes and Quantum Molecular Spintronics Based on Single-Molecule Magnets

Tea at 9.15 AM

All interested are welcome.

Amalendu Chandra
Dean of Research and Development