



RCMS NEWS

19

2018

NAGOYA UNIVERSITY
RESEARCH CENTER FOR MATERIALS SCIENCE

Reports and Communications of RCMS Activities
Reports and Communications of RCMS Activities
Reports and Communications of RCMS Activities
Reports and Communications of RCMS Activities
Reports and Communications of RCMS Activities

June 2018
Issue #19



CONTENTS

Integrated Research Consortium on Chemical Sciences	2
Core-to-Core Program The 21 st Joint Symposium	4
Research Topic	6
Integrative Graduate Education and Research Program in Green Natural Sciences	8
Visiting Professor 2017	9
Report on the Chemical Instrumentation Facility	10
RCMS Seminars	11
Chemistry Gallery	18
Awards 2017	19
Staff List	20



Integrated Research Consortium on Chemical Sciences 2017

In 2017, IRCCS, Integrated Research Consortium on Chemical Sciences, a pioneering synthesis of a new scientific base and nurturing the next generation of researchers (Hokkaido University Institute for Catalysis, Nagoya University Research Center for Materials Science, Kyoto University International Research Center for Elements Science Institute for Chemical Research, Kyushu University Institute for Materials Chemistry and Engineering) held the symposium below.

The 1st Young Researchers Forum

(Inuyama city, Aichi, July 28–29, 2017)



Asst. Prof. Naka, organizer,
Nagoya University



Prof. Awaga, Observer



Round-table discussion



Breakfast



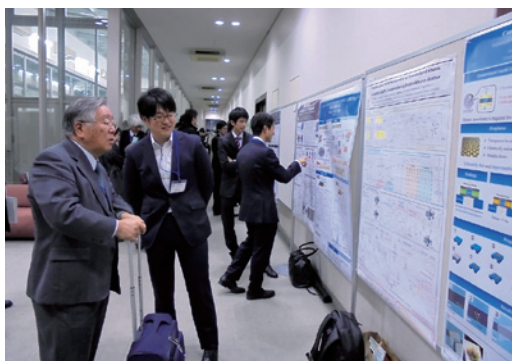
Group photo



Inuyama castle

The 3rd Symposium

(Kyoto University, October 30–31, 2017)



Poster session



Asst. Prof. Omachi, Nagoya



Group photo

The 1st International Symposium

(Kyushu University, January 24–26, 2018)



Director of IRCCS, Prof. Tatsumi



Chair, Prof. Yamaguchi



Asst. Prof. Ogi, Nagoya



Poster

Core-to-Core Program

The 21st Joint Symposium

As part of the Core-to-Core Program “Strategic Research Networks (Type A)” operated by the Japan Society for the Promotion of Science (JSPS), the program “Elements Function for Transformative Catalysis and Materials” is promoted by the Research Center for Materials Science and the Department of Chemistry, Graduate School of Science at Nagoya University, with Professor Shigehiro Yamaguchi serving as Project Coordinator. In this program, joint research and dispatch of researchers is actively performed with the participating institutions at the University of Munster (Germany), the Technical University of Berlin (Germany), Queen’s University (Canada), and Kyoto University (Japan).

The Core-to-Core Program has enabled the deployment of master’s students, and outstanding young researchers expected to perform globally in the future can now be refined through participation in international joint research performed overseas at an early stage.

The 2017 academic year featured the 21st Joint Symposium when counting from the Japanese-German Graduate Externship program. The symposium was held at University of Muenster.

The 21st Joint Seminar

February 2 (Fri.), 2018; held at University of Münster, Germany

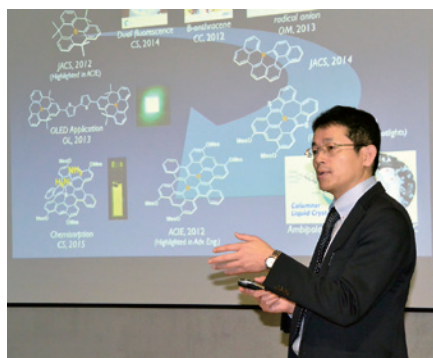
Participants from Japan: 8 professors, 6 students



Prof. Studer, Muenster



Chair, Muenster student



Prof. Yamaguchi, Nagoya





Prof. Crudden, Queen's




JSPS
Japan Society for the Promotion of Science
Core-to-Core Program

Core-to-Core Joint Symposium
February 2nd 2018
Münster

Queen's University, Kingston
Kyoto University
Westfälische Wilhelms-Universität Münster
Nagoya University

Location:
CeNTech Building
Heisenbergstraße 11
D-48149 Münster
Germany

Research Topic (Inorganic Synthesis)

Synthesis of a Supramolecular Cage Inspired by Induced-Fit-Type Molecular Recognition of Enzymes

Enzymes are the proteins that catalyze various biological reactions in living systems. It is well known that enzymes achieve highly efficient and substrate-specific catalytic reactions by utilizing their sophisticated molecular recognition abilities. There are two main models proposed to explain their molecular recognition abilities, namely “lock and key” and “induced-fit” models. In the “lock and key” model, the shape of the active site of the enzyme is considered to be perfectly complementary to the shape of the substrate, whereas in the “induced-fit” model, bindings of a substrate induce the change in the shape of the active site so that it become suitable for the molecular recognition. It is apparent that induced-fit model requires the structural flexibility as well as the huge protein structure as prerequisites.

Inspired by the induced-fit-type molecular recognition of enzymes, we recently developed a novel supramolecular cage, which is capable of recognizing various substrates strongly by changing its own structure to be suitable for the molecular recognition. In general, it is difficult to design a molecular cage having both of the abilities to change its own structure flexibly and to bind strongly to a substrate. In the case when the structure of the molecular cage is rigid enough as in the case with the “lock and key” model, the molecular cage can recognize its complementary substrate strongly. However, the more the structure of the cage becomes flexible, the cage-substrate complex becomes thermodynamically less stable because its structure is easy to be distorted.

To overcome this difficulty, we utilized the “rotaxane”, a well-known supramolecular structure, in which a ring molecule is threaded by a thread molecule. The structure of the supramolecular cage **1** is shown in **Fig. 1**. **1** is a multiply interlocked molecular assembly in which a phthalocyanine bearing four peripheral crown ethers are quadruply interlocked with a porphyrin dimer bridged quadruply with flexible alkylammo-

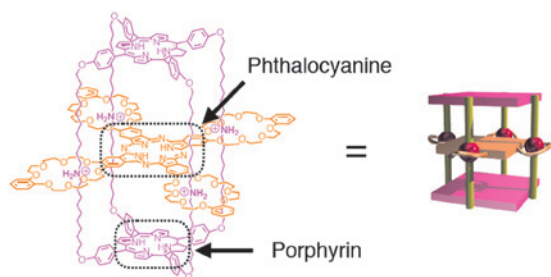


Fig. 1. Structure of a supramolecular cage **1**.

onium chains. As a result, **1** has two nanospaces in between a phthalocyanine unit and the edge porphyrins. Furthermore, the phthalocyanine unit can slide along the alkylammonium sidechains of the porphyrin dimer like a slide-door because they are connected each other via rotaxane structure. Actually, we confirmed that **1** could encapsulate a molecule whose size is larger than that of the accesses to the inner nanospaces of **1**. It was also found that **1** showed unique molecular recognition processes. During the recognition of **2** (**Fig. 2(a)**), two **2** was found to bind one by one in each nanospace of **1**. This implies that the affinity of the first binding is much larger than the second binding. We suppose that this molecular recognition might be due to that **1** could undergo the slide door-type structural transformation as described in **Fig. 2(b)**.

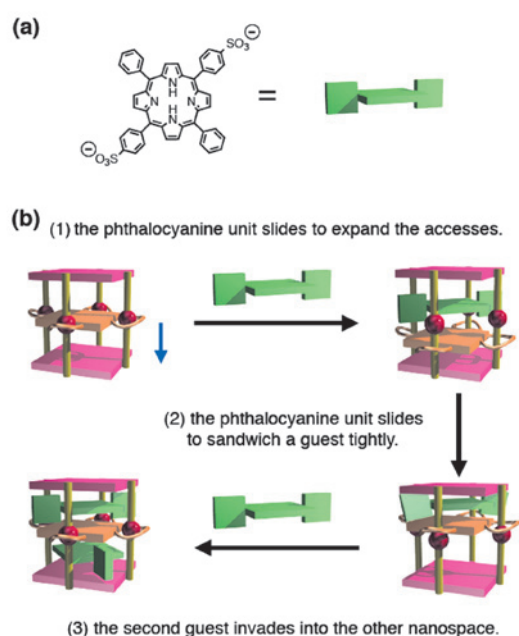


Fig. 2. (a) Structure of a guest molecule **2** and (b) a schematic representation of the encapsulation process of **2** by **1**.

Reference

- [1] Y. Yamada, R. Itoh, S. Ogino, T. Kato, K. Tanaka, *Angew. Chem. Int. Ed.*, **2017**, 56, 14124-14129.

(Yasuyuki Yamada)

Research Topic

(Molecular Catalysis)

Conversion of Water for Organic Synthesis

The title statement may sound strange, especially to experts in organic chemistry, because water is a popular “enemy” in organic synthesis. In standard organic synthesis, chemists usually remove water from their flasks completely, in order to avoid any type of undesirable side-reactions caused by water. However, Nature often produces numerous kinds of organic products by using water as a starting material. For example, cells in your body rapidly produce organic materials by using water and enzymes under aqueous conditions for keeping your life sustainable; plants produce carbohydrates and dioxygen from water and carbon dioxide through photosynthesis. Inspired by the above-mentioned splendid activities in Nature, we set our research focus to develop new methods for organic synthesis using water as a starting material.

Catalytic Hydration of Organic Compounds

Catalytic hydration of organic compounds is a fundamental reaction both in the academic chemistry and industrial chemical production. We have recently disclosed that a fluorinated cobalt(III) porphyrin complex effectively promotes the hydroalkoxylation of terminal alkynes to give acetals (Figure 1).^[1] Because the acetals are very easily hydrolyzed to ketones, this transformation can be regarded as the formal hydration of alkynes to ketones. The current method was found to be more efficient than our previous method for the hydration of terminal alkynes.^[2]

Organic Synthesis with Light Energy

Chemical synthesis using sunlight energy is a dream of the whole human beings. Photochemical transformation of biomass-derived or renewable substances using water as a hydrogen source is an important challenge for promoting green and sustainable chemistry. Aiming at establishing a new scientific basis for such artificial photosynthesis,

we have recently developed the photocatalytic dehydrogenation of primary alcohols to aldehydes (Figure 2).^[3] Noteworthy in this transformation is the unusual selectivity for C–O bond cleavage over C=C double bond reduction under the photo-redox-conditions.

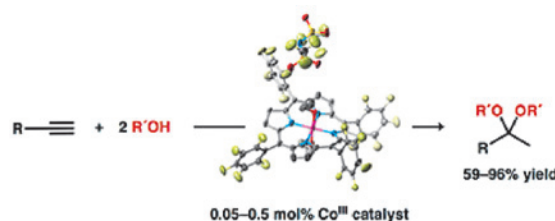


Figure 1. Cobalt-catalyzed hydroalkoxylation of alkynes

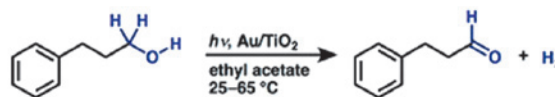


Figure 2. Photocatalytic dehydrogenation of alcohols

References

- [1] R. Ushimaru, T. Nishimura, T. Iwatsuki, H. Naka, A Fluorinated Cobalt(III) Porphyrin Complex for Hydroalkoxylation of Alkynes. *Chem. Pharm. Bull.* **65**, 1000–1003 (2017).
- [2] T. Tachinami, T. Nishimura, R. Ushimaru, R. Noyori, H. Naka, Hydration of Terminal Alkynes Catalyzed by Water-Soluble Cobalt Porphyrin Complexes. *J. Am. Chem. Soc.* **135**, 50–53 (2013).
- [3] M. Shibata, R. Nagata, S. Saito, H. Naka, Dehydrogenation of Primary Aliphatic Alcohols by Au/TiO₂ Photocatalysts. *Chem. Lett.* **46**, 580–582 (2017).

(Hiroshi Naka)

Integrative Graduate Education and Research Program in Green Natural Sciences (IGER)

Integrative Graduate Education and Research (IGER) Program in Green Natural Sciences was launched in 2011, and built on three pillars: (I) practicing cutting-edge fundamental natural science research, (II) completion of sufficient coursework to enable that research, and (III) graduate school literacy education (English training, studying abroad, skill seminars, etc.). Based on these, the program aims to nurture the “scientific ability and social skills to view situations from a broad perspective,” “developmental ability to extract practical results from fundamental research,” and “active international citizenship on a global scale,” along with fostering “corporate researchers cultivated as seeds in industry,” “academic researchers raised in the scholarly domain,” and “environmental coordinators and mentors active throughout global society” that will carry the environmental fields of the next generation.

In FY2017, the program provided opportunity for 60 students to participate in international conferences held at outside Japan, and also provided opportunity of mid-term (2–3 months) overseas research exchange for 14 students. Furthermore, the program hosted various international symposium / workshop where lots of students could have opportunities to discuss with foreign researchers.

Eleven students participated in the Leadership Program at North Carolina (NC), US. All students not only attended lectures regarding Leadership, Entrepreneurship and Technology Transfer but also visited many laboratories in universities at NC to build networks with PIs, postdocs and graduate students. In addition, all of them had opportunities to do presentations on their research to these researchers and have discussions. Furthermore, they visited some companies to learn some ideas of working in industry as a researcher and business environment in the USA from entrepreneurs and researchers.



Group photo in International Conference



Farewell Party in the NC Program



Collaboration Research in University of Glasgow

Visiting Professor 2017

Prof. Michael P. Shaver

Professor,
The University of Edinburgh

Period of Stay:

December 5, 2017 – January 26, 2018

Research Theme:

Synthesis of Functional Polymers



Prof. Michael P. Shaver from the University of Edinburgh, the United Kingdom, stayed as a visiting professor in RCMS for two months since Dec. 5th, 2017, working on synthesis of functional polymers. He is a rising star in the field of organic polymer chemistry, and is the youngest professor in Department of Chemistry, UoE. During his stay, we collaborated on application of finely-designed organic polymers with specific structures to organic electronics.

In Nagoya University, he attended to the group meetings of the Saito and Awaga groups, and visited many laboratories in Department of Chemistry, School of Science, giving valuable advices to students and young researchers. He was full of curiosity and had an interest in everything. He gave an IGER-RCMS seminar, “New Monomers in Ring-opening and Radical Polymerisations for Sustainable and Functional Polymers” on Dec. 8th. He also visited several laboratories in Department of Applied Chemistry, School of Engineering, and gave a seminar there. His contribution to Nagoya University was very significant in both research and education. He will be a key person for future collaboration between NU and UoE.

Prof. Shaver, born in Canada, is a great beer lover, and has a deep knowledge on craft beer in the world. He loves a Nagoya craft beer, which is not well known among us. He visited a craft beer bar in Nagoya almost every weekend, and made many friends there. When he tried the NU beer in a banquet, we received his strong admiration for its flavor.

With a lot of good memories in Japan, he returned to the UK on Jan. 27th, 2018.

Report on the Chemical Instrumentation Facility

The Chemical Instrumentation Facility is a facility shared by the whole university that contains instrumental analysis equipment including a nuclear magnetic resonance (NMR) spectrometer, mass spectrometer, and spectroscopic analysis equipment for analyzing molecular structures. In the Chemical Instrumentation Facility, services are provided to users including teaching faculty, researchers, and students through maintenance of these measurement instruments, lectures on measurement methods, consultations for specific measurements, and entrusted measurement. In 2017, Prof. Susumu Saito took the position of president of our facility. We conducted the management and operation under his direction in order to improve our services. During the 2017 fiscal year, as shown in "CIF Utilization Status", 74 research groups from the university registered to use the facility, and the number of teaching faculty, students,

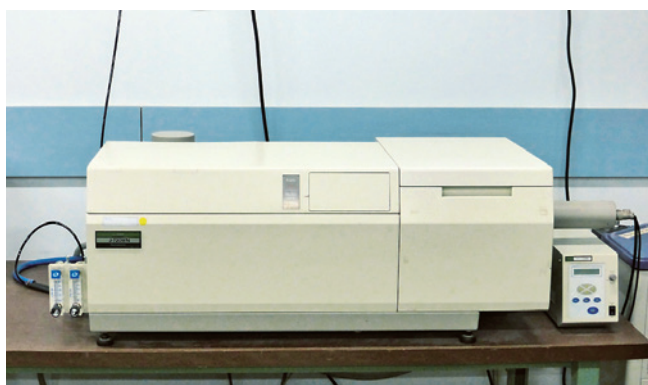
and researchers who registered to use the facility during the year was 746.



NMR Room



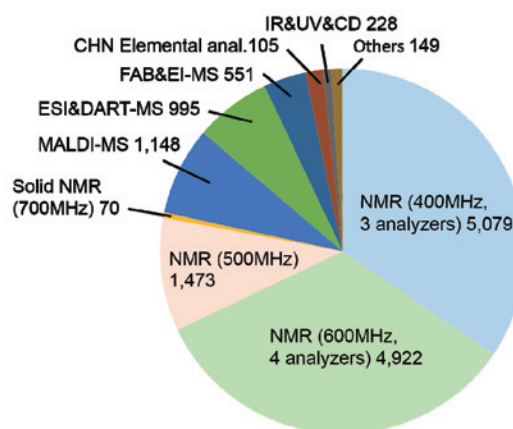
DART-MS (JMS-T100TD, JEOL)



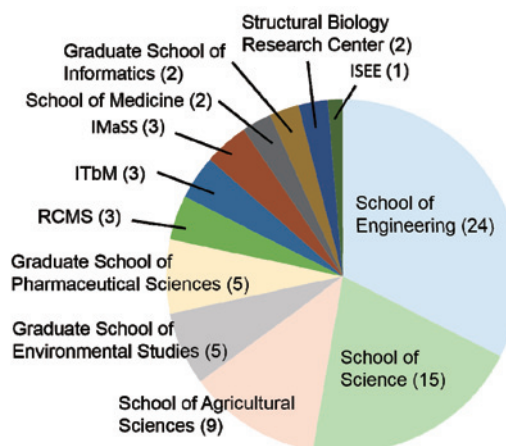
Circular Dichroism spectrometer (J-720, JASCO)

[CIF Utilization Status]

Utilization Status for the Academic Year 2017
(April 2017 – February 2018)




Number of Uses/Measurements by Instrument


 Utilization Status by Department
(Total: 74 Groups, 746 People)

RCMS Seminars

IGER-ITbM-RCMS Seminar


Prof. Christoph A. Schalley
Freie Universität Berlin



"Systems Chemistry: From Logic Gates based on Supramolecular Gels to Supramolecular Polymer Transporters"

April 12, 2017 (Wed) 13:15–14:45
Institute of Transformative Bio-Molecules (ITbM) 1F, Lecture Room

Host: Shigehiro Yamaguchi (789-2291)




プラットフォーム・グリーン物質変換コース

April 12, 2017 Prof. Christoph A. Schalley
(Freie Universität Berlin)
"Systems Chemistry: From Logic Gates based on Supramolecular Gels to Supramolecular Polymer Transporters"

April 12, 2017 Prof. Patrick G. Harran
(D.J. & J.M. Cram Chair in Organic Chemistry, UCLA, USA)
"Tactics and Strategy in Complex Molecule Synthesis"

PS-IGER-RCMS SEMINAR


Prof. Patrick G. Harran
D.J. & J.M. Cram Chair in Organic Chemistry
UCLA, USA



"Tactics and Strategy in Complex Molecule Synthesis"


April 12, 2017 (Wed) 16:00–
Noyori Materials Science Laboratory 2F, Lecture Room

Host: Masato Kitamura
Graduate School of Pharmaceutical Sciences



IGER & RCMS Seminar

Cu(II)/Cu(I) electron transfer coupled to dioxygen activation in biomimetic complexes: from solution to calix-zymes grafted on an electrode



Prof. Yves LE MEST
CNRS, Université de Brest

Tue., Apr. 18, 2017, 15:30-16:30
Noyori Materials Science Laboratory 2F, Lecture Room

Contact: Kentaro Tanaka (2940)
E-mail: kentaro@chem.nagoya-u.ac.jp

April 18, 2017 Prof. Yves LE MEST
(CNRS, Université de Brest)
"Cu(II)/Cu(I) electron transfer coupled to dioxygen activation in biomimetic complexes: from solution to calix-zymes grafted on an electrode"

May 17, 2017 Prof. George SHIMIZU
(Department of Chemistry, University of Calgary, Canada)
"CO₂ Capture and Proton Conduction in Metal Organic Frameworks"

ITbM-IGER-RCMS Seminar

Prof. George SHIMIZU
Professor
Department of Chemistry
University of Calgary
Canada

CO₂ Capture and Proton Conduction in Metal Organic Frameworks

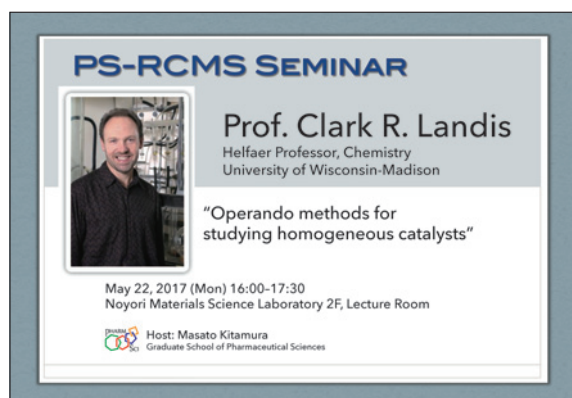
Date: May 17, 2017, Time: 14:45 - 16:15
Noyori Materials Science Laboratory, 2F
Language: English

Metal organic frameworks (MOFs) represent tunable molecular scaffolds that can be adjusted for a breadth of applications. This presentation will discuss our efforts towards tailoring MOFs towards two globally relevant energy challenges, CO₂ capture and fuel cells. The first topic concerns MOFs as proton conductors. In this light, MOFs offer several interesting prospects stemming from their modular syntheses and tunable pore structures. MOFs have been shown to be able to conduct protons over 10³ S/cm⁻¹ conduct above the boiling point of water¹ and also to be robust in humid atmospheres² – an ongoing challenge is to merge all desirable properties in one material. Even when the properties of the MOF may not meet a required industrial standard, the crystallinity of the MOF can allow for added insights to designing better materials and as a foothold for modelling studies.³ This aspect of the talk will cover some recent work to fine tune proton conduction but also efforts to make robust materials.

For the carbon capture portion, the talk will concern the factors that both make a solid an academically interesting capture material and also those that carry forward to more practical application. In contrast to liquid amines which chemisorb CO₂ and have high energy costs for regeneration, the MOF approach typically gives physisorbed gases and hence more facile release.⁴ This topic will cover factors affecting CO₂ affinity in MOFs.⁵ Finally, we will present a new MOF with high stability and the ability to capture CO₂ via a physisorption mechanism in wet gas.⁶

1. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 2. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
3. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 4. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
5. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 6. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
7. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 8. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
9. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 10. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
11. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 12. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
13. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 14. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
15. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 16. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
17. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 18. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
19. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 20. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
21. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 22. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
23. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 24. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
25. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 26. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
27. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 28. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
29. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 30. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
31. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 32. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
33. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 34. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
35. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 36. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
37. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 38. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
39. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 40. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
41. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 42. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
43. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 44. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
45. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 46. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
47. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 48. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
49. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 50. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
51. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 52. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
53. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 54. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
55. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 56. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
57. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 58. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
59. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 60. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
61. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 62. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
63. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 64. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
65. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 66. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
67. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 68. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
69. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 70. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
71. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 72. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
73. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 74. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
75. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 76. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
77. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 78. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
79. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 80. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
81. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 82. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
83. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 84. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
85. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 86. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
87. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 88. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
89. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 90. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
91. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 92. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
93. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 94. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
95. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 96. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
97. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 98. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.
99. G. S. Tanaka, et al. *Bull. Chem. Soc. Jpn.* 2014, 87, 110. 100. Bostelin, M. et al. *CHIMIEPLUSCHEM* 2014, 81, 391-394.

Contact:
Cathleen M. Crudden and Masakazu Nambo
E-mail: mnambo@itbm.nagoya-u.ac.jp



PS-RCMS SEMINAR

Prof. Clark R. Landis
 Helfaer Professor, Chemistry
 University of Wisconsin-Madison

“Operando methods for studying homogeneous catalysts”

May 22, 2017 (Mon) 16:00-17:30
 Noyori Materials Science Laboratory 2F, Lecture Room

Host: Masato Kitamura
 Graduate School of Pharmaceutical Sciences

May 22, 2017 Prof. Clark R. Landis
 (Helfaer Professor, Chemistry University of Wisconsin-Madison)
 “Operando methods for studying homogeneous catalysts”

June 12, 2017 Prof. Mario Ruben
 (Karlsruher Institute of Technology)
 “Surface-confined Coordination Chemistry: Convergent vs Divergent Features”



RCMS-IGER Seminar

“Surface-confined Coordination Chemistry: Convergent vs Divergent Features”

Lecturer: Prof. Mario Ruben
 (Karlsruher Institute of Technology)

Date: Mon. 12th June. 16:00 – 17:30

Place: Seminar Rome in Science South Building

Contact: Kunio Awaga (ext. 2487)



IGER-RCMS Seminar

“超ポルフィリンの化学”

大須賀 篤弘 教授
 (京都大学大学院 理学研究科)

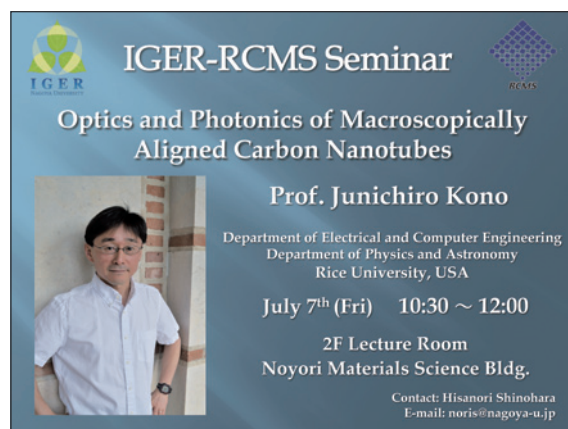
平成29年6月28日(水)
 15:00 ~ 16:30

野依記念物質科学研究館
 2F講演室

連絡先: 藤原 久典 (noris@nagoya-u.jp)

June 28, 2017 Prof. Atsuhiro Osuka
 (Graduate School of Science, Kyoto University)

July 7, 2017 Prof. Junichiro Kono
 (Department of Electrical and Computer Engineering,
 Department of Physics and Astronomy, Rice University, USA)
 “Optics and Photonics of Macroscopically Aligned Carbon Nanotubes”



IGER-RCMS Seminar

Optics and Photonics of Macroscopically Aligned Carbon Nanotubes

Prof. Junichiro Kono
 Department of Electrical and Computer Engineering
 Department of Physics and Astronomy
 Rice University, USA

July 7th (Fri) 10:30 ~ 12:00

**2F Lecture Room
 Noyori Materials Science Bldg.**

Contact: Hisanori Shinohara
 E-mail: noris@nagoya-u.jp

IGER and RCMS Seminar

"Surface-Enhanced Raman Scattering (SERS) for Rapid Antibiotic Susceptibility Test of Bacteria from Sepsis Patients"



Prof. Yuh-Lin Wang
IAMS, Distinguished Research Fellow,
Taiwan

July 11 (Tue), 2017,
16:15 ~ 17:15
Noyori Materials Science Laboratory
Chemistry Gallery


host: Akiyoshi Hishikawa (2494)
hishi@chem.nagoya-u.ac.jp

プラットフォーム：ナノ・エネルギー

July 11, 2017 Prof. Yuh-Lin Wang
(IAMS, Distinguished Research Fellow, Taiwan)
"Surface-Enhanced Raman Scattering (SERS) for
Rapid Antibiotic Susceptibility Test of Bacteria from Sepsis
Patients"

July 18, 2017 Prof. John Arnold
(Department of Chemistry, UC Berkeley, USA)
"New Reactivity in Actinide Chemistry Facilitated by
Supporting Ligand Design"

PS-IGER-RCMS SEMINAR




Prof. John Arnold
Department of Chemistry
UC Berkeley, USA

"New Reactivity in Actinide Chemistry
Facilitated by Supporting Ligand Design"


July 18, 2017 (Tue) 16:00-
Noyori Materials Science Laboratory 2F, Chemistry Gallery

Host: Masato Kitamura
Graduate School of Pharmaceutical Sciences




IGER & RCMS Seminar

**The Role of Porphyrins in Biology: From Protein
Biochemistry to Antimicrobial Materials**



Prof. Reza A. Ghiladi
North Carolina State University

July 19th, 2017 15:00 ~ 16:30
Noyori Materials Science Laboratory
Chemistry Gallery




IGER
NAGOYA UNIVERSITY

博士課程教育
リーディング
プログラム
Program for
Leading
Graduate Schools

Contact: Osami Shoji
E-mail: shoji.osami@a.mbox.nagoya-u.ac.jp

July 19, 2017 Prof. Reza A. Ghiladi
(North Carolina State University)
"The Role of Porphyrins in Biology: From Protein
Biochemistry to Antimicrobial Materials"

IGER and RCMS Seminar



Photoelectron momentum distribution induced by circularly polarized laser field

Pham Nguyen Thanh Vinh
Lecturer, Department of Physics,
HCMC University of Pedagogy

Sept. 28 (Thu), 2017,
15:30 - 17:00
Noyori Materials Science Laboratory Chemistry Gallery


host: Akiyoshi Hishikawa (2494)
hishi@chem.nagoya-u.ac.jp

プラットフォーム：ナノ・エネルギー

September 28, 2017 Pham Nguyen Thanh Vinh
(Lecturer, Department of Physics, HCMC University of Pedagogy)

“Photoelectron momentum distribution induced by circularly polarized laser field”

September 29, 2017 Prof. Yannick HOARAU
(Strasbourg University)
“Numerical fluid mechanics research in Icube laboratory”



RCMS • IGER Seminar

“Numerical fluid mechanics research in Icube laboratory”

Lecturer : Prof. Yannick HOARAU
(Strasbourg University)

Date : Fri. 29th Sep. 13:30 – 15:00

Place: Chemistry Gallery

The Micafix team (<http://icube-micafix.unistra.fr/en/index.php/WELCOME>) of the Icube laboratory mainly focuses on modeling, experimentation and computational fluid dynamic in interaction with its environment. The activity of the Micafix team is related to transport problems in fluid flows and in porous media. I will briefly present an overview of the team research activities and then switch to my own research activity.
My research focuses on computational fluid dynamics in many fields of application. Based on the development of the NSM3 solver, I have studied unsteady turbulence modeling for detached flow, shock-wave / boundary layers interaction, fluid-structure interaction, cavitation and icing modeling. I have also worked on the numerical simulation of polymerisation reactions in a highly efficient helical reactor and finally biomechanical flows (flow and particle transport and deposition in airways and blood flows). I will briefly describe the numerical software that we have developed and talk more about icing modeling and biomechanical flows.

Contact: Kunio Awaga (ext. 2487)

名古屋大学巡講

Construction and Application of Zeolitic Nanoporous Materials



Lecturer: Prof. Jihong Yu
(Jilin Univ.)

Date: Oct. 2nd, 15:00 – 16:30

Place: Lecture Room in Noyori Mat. Sci. Lab.



Zeolitic materials with nanoporous architectures are involved in various processes of current interest, such as energy saving catalytic processes, environmentally benign sorbents, storage materials for waste and energy, etc. In recent years, we have been devoting our efforts to the computational prediction, rational synthesis, and application of zeolitic materials in energy and environments. We have developed computational methodologies for the prediction of zeolitic materials with desirable porous architectures and properties. Toward the rational synthesis, we have proposed three main strategies on the basis of pre-designed organic structure-directing agent, the heteroatom substitution and computational data mining. By utilization of these synthetic strategies, novel zeolitic materials with desired porous structures and excellent properties can be targeted. Furthermore, we have discovered that the zeolite synthesis mechanism can be promoted through free radicals, which shed a new light on zeolite crystallization. Taking advantage of their confined nanopores and unique properties, we have also explored some new applications of zeolitic materials in H₂ production, liquid separation and light emitting that are beyond their traditional applications.




RCMS • IGER Seminar Contact : Kunio Awaga (ext. 2487)



October 2, 2017 Prof. Jihong Yu
(Jilin University)
“Construction and Application of Zeolitic Nanoporous Materials”

IGER-ITbM-RCMS Seminar

Prof. Matthias Wagner
 Institute for Inorganic and Analytical Chemistry,
 Goethe-Universität Frankfurt



"The Advance of Organoboranes From Useful Little Helpers to Key Compounds in Materials Science and Catalysis"

  **October 11, 2017 (Wed) 13:00–14:30**
 Institute of Transformative Bio-Molecules (ITbM) 1F, Lecture Room
 Host: Shigehiro Yamaguchi (789-2291)


プラットフォーム・グリーン物質変換コース

October 11, 2017 Prof. Matthias Wagner
 (Institute for Inorganic and Analytical Chemistry,
 Goethe-Universität Frankfurt)
"The Advance of Organoboranes From Useful Little Helpers to Key Compounds in Materials Science and Catalysis"



October 16, 2017 Prof. Todd Hudnall
 (Dept. Chemistry and Biochemistry, Texas State University)
"Electrophilic Carbenes: Tales of Main Group Chemistry, Radicals, and Photochemistry"

IGER-ITbM-RCMS Seminar

Prof. Todd Hudnall
 Dept. Chemistry and Biochemistry,
 Texas State University



"Electrophilic Carbenes: Tales of Main Group Chemistry, Radicals, and Photochemistry"

  **October 16, 2017 (Mon) 13:00–14:30**
 Institute of Transformative Bio-Molecules (ITbM) 1F, Lecture Room
 Host: Shigehiro Yamaguchi (789-2291)

プラットフォーム・グリーン物質変換コース

 **IGER & RCMS Seminar** 

Chemical Reactivity of Metal Coordinated Azo-Aromatics: Present and Future



Prof. Sreebrata Goswami
 Indian Association for the Cultivation of Science



Mon., Nov. 6, 2017, 15:40-16:40
 Noyori Materials Science Laboratory 2F, Chemistry Gallery (Seminar Room)
 Contact: Kentaro Tanaka (2940)
 E-mail: kentaro@chem.nagoya-u.ac.jp

November 6, 2017 Prof. Sreebrata Goswami
 (Indian Association for the Cultivation of Science)
"Chemical Reactivity of Metal Coordinated Azo-Aromatics: Present and Future"

IGER and RCMS Seminar



”高強度赤外光源によるアト秒軟X線科学”



板谷 治郎 准教授
 東京大学物性研究所
 極限コヒーレント光科学研究センター(LASOR)

日時： 2017年11月9日(木) 16:00 - 17:00
 会場： 野依記念物質科学研究館2階「ケミストリーギャラリー」


連絡先： 蘆川 明栄 (内線2494)
hishi@chem.nagoya-u.ac.jp

プラットフォーム： ナノ・エネルギー


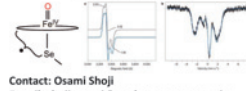
November 9, 2017 Associate Prof. Jiro Itatani
 (Laser and Synchrotron Research Center (LASOR)
 The Institute for Solid State Physics (ISSP), the University of
 Tokyo)

November 14, 2017 Prof. Michael T. Green
 (University of California, Irvine)
 “Selenocysteine-Ligated Cytochrome P450 Compound I :
 A Direct Link Between Electron Donation and Reactivity”

IGER & RCMS Seminar
**Selenocysteine-Ligated Cytochrome P450
 Compound I: A Direct Link Between
 Electron Donation and Reactivity**




Prof. Michael T. Green
 University of California, Irvine
 Nov. 14, 2017 15:30 ~ 17:00
 Noyori Materials Science Laboratory
 Chemistry Gallery


博士課程
 一歩一歩
 プログラム
 Program for
 Leading
 Graduate Schools

Contact: Osami Shoji
 E-mail: shoji.osami@a.mbox.nagoya-u.ac.jp

RCMS・IGER Seminar



”New Monomers in Ring-opening and Radical Polymerisations for Sustainable and Functional Polymers”



Prof. Michael P. Shaver
 (University of Edinburgh)
 (Visiting Prof. of RCMS in 2017)
 Date : Fri. 8th Dec. 10:30 – 12:00
 Place : Chemistry Gallery in Noyori Mat. Sci. Lab.

In light of the environmental and economic challenges facing petroleum-derived plastics, new polymers can address one of two significant challenges. The first is sustainability, seeking to develop materials that are built from renewable resources or degrade in our environment. To make a difference, these materials need to offer a competitive economic advantage in either synthesis or end-of-life use on top of an environmental step change. The second is functionality, developing materials that are unique in their ability to perform a specific function, adding significant value to their performance and allowing us to continue to push the boundaries of how we shape our world. This talk will cover a series of vignettes from the Green Materials Laboratory at the University of Edinburgh, capturing some of our work in each of these areas. More specifically, the talk will feature our work on sustainable polymers, including the development of new “closed loop” polymers which can be both polymerised and depolymerised using a designer aluminium catalyst and new routes to degradable polyoxymethylene. Understanding of reaction mechanisms and catalytic design has helped shape our progress and guide our current work. We will also discuss our more applied work, first on the development of responsive polymer nanocomposites that can act as incooperative miRNA sensors and our preparation of the first polymeric variants of frustrated Lewis pairs which serve as self-healing and responsive materials.

Contact: Kunio Awaga (ext. 2487)

December 8, 2017 Prof. Michael P. Shaver
 (University of Edinburgh)
 “New Monomers in Ring-opening and Radical
 Polymerisations for Sustainable and Functional Polymers”




RCMS & IGER Seminar

次元クロスオーバーにおける
新しい物性化学

京都大学大学院理学研究科 教授
物質科学国際研究センター 客員教授



北川 宏 先生



日時：2018年2月7日（水） 15:30-17:00
 場所：野矢弘志物質科学研究所2階講演室
 連絡先：唯 美津木（内線6200）


February 7, 2018 Prof. Hiroshi Kitagawa
(Graduate School of Science, Kyoto University)

March 14, 2018 Prof. Dr. Peter R. Schreiner
 (Institute of Organic Chemistry, Justus Liebig University
 Giessen, Giessen, Germany)
 "Nanodiamondoids as the Next Generation Carbon
 Materials"

Lab Seminar

**Nanodiamondoids
as the Next Generation Carbon Materials**



Prof. Dr. Peter R. Schreiner
 Institute of Organic Chemistry,
 Justus Liebig University Giessen,
 Giessen, Germany.

3/14(Wed) 13:30~15:00
 Research Center for Materials Science
 Chemistry Gallery

IGER-RCMS Seminar


Dr. John C. Gordon
 Scientist 5, AAAS Fellow
 Los Alamos National Laboratory, USA

**Some New Insights into the Efficient
 Outer Sphere Hydrogenation of
 Carbonyl Containing Substrates**

March 15 (Thursday) 10:30-12:00
 Noyori Materials Science Laboratory
 2F Lecture Room

Contact: Susumu SAITO
 saito.susumu@f.mbox.nagoya-u.ac.jp



プラットホーム・グリーン物質変換

March 15, 2018 Dr. John C. Gordon
 (Scientist 5, AAAS Fellow, Los Alamos National Laboratory,
 USA)
 "Some New Insights into the Efficient Outer Sphere
 Hydrogenation of Carbonyl Containing Substrates"

Chemistry Gallery

The Chemistry Gallery (2nd Floor of the Noyori Materials Science Laboratory) welcomed many visitors again in the 2017 academic year.

13,089 people visited the gallery as of March 31, 2018 (according to an automatic counter for entry/exit to the gallery).

A particularly large number of visitors were welcomed during the following periods when Nagoya University was open to the public.

Number of visitors during Open Campus : 816 (August 8 to 10)

Number of visitors on Homecoming Day : 510 (October 21)

At the Chemistry Gallery, guest can experience Dr. Noyori's sincere commitment, philosophy and passion that earned him the Nobel Prize, the greatest honor for a scientist. There is also a message to the next generation from Dr. Noyori. Symbolical words from Dr. Noyori's research handing down the profound mystery of Chemistry and the attitude of a genuine scientist of future chemists.



Awards 2017



Asst. Prof. Shinji Tanaka (The second from the right)
Incentive Award in Synthetic Organic Chemistry, Japan
February 15, 2018

拓く 研究者
182

名古屋大学物質科学センターの若手研究者、美津木唯先生は、燃料電池の性能向上に貢献するべく、触媒の可視化技術を開発している。その研究成果は、燃料電池の性能向上に大きく貢献している。美津木先生は、触媒の可視化技術を開発し、燃料電池の性能向上に貢献している。その研究成果は、燃料電池の性能向上に大きく貢献している。

名古屋大学物質科学センター 美津木唯 先生



触媒の可視化技術研究

触媒の可視化技術研究は、燃料電池の性能向上に大きく貢献している。その研究成果は、燃料電池の性能向上に大きく貢献している。その研究成果は、燃料電池の性能向上に大きく貢献している。

Prof. Mizuki Tada

Prof. Mizuki Tada
"The Kao Prize for Science 2016"
The Kao Foundation for Arts and Sciences
June 16, 2017

S. Ozawa, H. Matsui, M. Tada, et al. PCCP Poster Prize NENCS-RSC
October 28, 2017

Y. Tan, H. Matsui, M. Tada et al. Energy & Environmental Science
poster Prize NENCS-RSC
October 28, 2017

Staff List

Director	Professor	Shigehiro Yamaguchi	(2291)	yamaguchi@mbx.chem.nagoya-u.ac.jp
Special Advisor	University Professor	Ryoji Noyori		
Organic Synthesis	Professor	Shigehiro Yamaguchi	(2291)	yamaguchi@mbx.chem.nagoya-u.ac.jp
	Assistant Professor	Soichiro Ogi	(5750)	ogi.soichiro@chem.nagoya-u.ac.jp
	Assistant Professor	Akiko Yagi	(5873)	yagi.akiko@d.mbx.nagoya-u.ac.jp
Inorganic Synthesis	Professor	Mizuki Tada	(6200)	mtada@chem.nagoya-u.ac.jp
	Associate Professor	Hideo Takagi	(5473)	htakagi@chem.nagoya-u.ac.jp
	Associate Professor	Yasuyuki Yamada	(2471)	yy@chem.nagoya-u.ac.jp
	Designated Professor	Kazuyuki Tatsumi	(2474)	i45100a@nucc.cc.nagoya-u.ac.jp
Functional Materials	Professor	Akiyoshi Hishikawa	(2494)	hishi@chem.nagoya-u.ac.jp
	Assistant Professor	Zhang Zhongyue	(5106)	zhangzhongyue@i.mbx.nagoya-u.ac.jp
	Assistant Professor	Haruka Omachi	(3660)	omachi.haruka@a.mbx.nagoya-u.ac.jp
Biomaterials Research	Professor	Yoshihito Watanabe	(3049)	p47297a@nucc.cc.nagoya-u.ac.jp
	Assistant Professor	Fumiaki Tomoike	(2950)	tomoike@chem.nagoya-u.ac.jp
Molecular Catalysis	University Professor	Ryoji Noyori	(2956)	noyori@chem3.chem.nagoya-u.ac.jp
	Assistant Professor	Hiroshi Naka	(5411)	h_naka@nagoya-u.jp
	Assistant Professor	Shinji Tanaka	(2960)	tanaka@os.rcms.nagoya-u.ac.jp
Collaborative Studies	Guest Professor	Hiroshi Kitagawa (Professor, Kyoto University)		
	Guest Professor	Michael Patrick Shaver (Professor, University of Edinburgh)		
Chemical Instrumentation Facility	Manager / Professor	Susumu Saito	(5945)	saito.susumu@f.mbx.nagoya-u.ac.jp
	Assistant Professor	Chunguang Han	(3072)	hanc@ic.nagoya-u.ac.jp
	Technical official	Yutaka Maeda	(3069)	maeda@ic.nagoya-u.ac.jp
	Technical official	Kin-ichi Oyama	(3069)	oyama@ic.nagoya-u.ac.jp
International Advisory Board		Michael Grunze (Professor Emeritus, Heidelberg University)		
		Roald Hoffman (Professor Emeritus, Cornell University – Laureate, Nobel Prize in Chemistry)		
		Henri Boris Kagan (Professor Emeritus, Paris-Sud 11 University)		
		Atsuko Tsuji (Designated Professor, Nagoya University)		
Cooperating Faculty	Professor	Hisanori Shinohara (Graduate School of Science)	(2482)	noris@nagoya-u.jp
	Professor	Kenichiro Itami (Institute of Transformative Bio-Molecules)	(6098)	itami.kenichiro@a.mbx.nagoya-u.ac.jp
	Professor	Masato Kitamura (Graduate School of Pharmaceutical Sciences)	(2957)	kitamura@os.rcms.nagoya-u.ac.jp
	Professor	Susumu Saito (Graduate School of Science)	(5945)	saito.susumu@f.mbx.nagoya-u.ac.jp
	Distinguished Invited University Professor	Sumio Iijima	(6460)	ijimas@nagoya-u.jp
RCMS Office	Administrative Staff	Yuko Kihara	(5907)	kihara@os.rcms.nagoya-u.ac.jp
	Administrative Staff	Chiaki Yamamoto	(5902)	yamamoto@os.rcms.nagoya-u.ac.jp
	Administrative Staff	Sonoe Tankiku	(5908)	tankiku@os.rcms.nagoya-u.ac.jp