

Ryotaro Okabe

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EDUCATION

Graduate Program in Chemistry, Massachusetts Institute of Technology, Cambridge, MA, USA

Sept. 2021–Present

- Physical chemistry subdivision
- Coursework: Quantum mechanics, Statistical Mechanics
- TA: 5.611 Introduction to Spectroscopy *Sept. 2021–Oct. 2021*
- 5.612 Electronic Structures of Molecules *Oct. 2021–Dec. 2021*

Master of Engineering, Tokyo Institute of Technology, Kanagawa, Japan/Sept. 2019–Sept. 2021

Department of Life Science and Technology, GPA: 3.63/4.50

- Thesis: Development of a solvent suppression method with adiabatic pulse and its application for proton-detected solid-state NMR measurements of biological samples.
- Coursework: Organic and Bioorganic Chemistry, Neuroscience, Biophysics

Bachelor of Engineering, Tokyo Institute of Technology, Kanagawa, Japan/Apr. 2016–Sept. 2019

Department of Life Science and Technology, GPA: 3.92/4.00 (*Early Graduation*)

- Coursework: Physical Chemistry, Organic Chemistry, Biochemistry, Biostatistics

RESEARCH EXPERIENCE

Tokyo Institute of Technology Kanagawa, Japan / Oct. 2018–Aug. 2021

Bachelor's and master's thesis research under Prof. Yoshitaka Ishii

Graduate trainee in the NMR science and development division of RIKEN, Japan's largest scientific research institute, Kanagawa, Japan

- Synthesized protein samples for solid-state nuclear magnetic resonance (SSNMR).
- Implemented new SSNMR pulse sequences with a solvent suppression pulse.
- Evaluated a new solvent suppression pulse sequence through multidimensional SSNMR experiments with protein samples and numerical simulations.
- Developed homonuclear recoupling methods with ultra-fast magic angle spinning (MAS) SSNMR to observe distance restraints between distant atoms of protein samples.
- Created deep learning tools to analyze the interactive relationship between atomic coordinates and chemical shifts of proteins.

Yale University, New Haven, CT, USA / Jan.–Apr. 2019

Research internship under Prof. Charles A. Schmuttenmaer

- Optimized synthesis conditions of metal-organic frameworks (MOFs) as photosensitizers and

characterized them using powder X-ray diffraction (PXRD).

- Carried out electrochemical and photoelectrochemical experiments to analyze the photochemical properties of MOFs as photocatalysts.
- Conducted time-resolved terahertz spectroscopy (TRTS) experiments to observe electron injections from MOFs into metal oxides.

Rice University, Houston, TX, USA / Aug.–Sept. 2018

Research internship under Prof. Angel A. Martí

- Applied a fluorometer to monitor the aggregation kinetics of Amyloid beta (A β) protein.
- Observed phenomenon that a metal complex inhibited A β monomers from aggregating.

PUBLICATIONS

1. Brian Pattengale, Jens Neu, Sarah Ostresh, Gongfang Hu, Jacob A. Spies, **Ryotaro Okabe**, Gary W. Brudvig, Charles A. Schmuttenmaer. “Metal-Organic Framework Photoconductivity via Time-Resolved Terahertz Spectroscopy,” *J. Am. Chem. Soc.* **2019**, *141*, 9793–9797.
2. Brian Pattengale, Jessica G. Freeze, Matthew J. Guberman-Pfeffer, **Ryotaro Okabe**, Sarah Ostresh, Subhajyoti Chaudhuri, Victor S. Batista, Charles A. Schmuttenmaer, “A Conductive Metal-Organic Framework Photoanode,” *Chem. Sci.* **2020**, *11*, 9593–9603.
3. Tatsuya Matsunaga, **Ryotaro Okabe**, Yoshitaka Ishii, “Efficient solvent suppression with adiabatic inversion for ¹H-detected solid-state NMR” *J. Biomol. NMR.* **2021**, *in press*.

PRESENTATIONS

1. **22nd International Society of Magnetic Resonance Conference (online) / Aug. 2021**
Poster Presentation: “Theoretical explanation of new solvent suppression scheme with adiabatic pulse and application for solid-state NMR experiments”
2. **2020 TKT CAMPUS Asia Research Symposium, Student Chair (online) / Dec. 2020**
An online symposium offered by Tsinghua University (China), KAIST (Korea) and Tokyo Tech
Oral presentation: “Challenges of High-Resolution Structural Analysis of Proteins - The New Method to Remove Unwanted Artifacts in Solid-State NMR”
3. **The 59th Annual Meeting of the NMR Society of Japan, Gunma, Japan / Nov. 2020**
Poster Presentation: “Development of Suppression Pulse with Adiabatic Pulse and Application for Biological Solid-State NMR”
4. **The 58th Annual Meeting of the NMR Society of Japan, Kanagawa, Japan / Nov. 2019**
Poster Presentation: “Development of Suppression Pulse with Adiabatic Pulse for Solid-State NMR Experiment”
5. **Joint Rice Center for Quantum Engineering-Nakatani RIES Fellowship Poster Session Houston, TX, USA / Sept. 2018**
Poster Presentation: “Amyloid- β aggregation affected by Oxidized A β ”

SCHOLARSHIPS & AWARDS

1. Graduate scholarship from Heiwa Nakajima Foundation / *Sept. 2021–Aug. 2023*
 - A stipend of \$1,843.79/month for two years and a round-trip travel fee.
2. The Best Audience Award at 2020 TKT CAMPUS Asia Research Symposium / *Dec. 2020*
3. Young Scientists Poster Award at the Annual Meeting of the NMR Society of Japan / *Nov. 2020*
4. Graduate scholarship from Japan's Nakatani Foundation for progress in measuring technologies used in biomedical analysis / *Oct. 2019–Aug. 2021*
5. The Best Presentation Award as part of a mid-term presentation for my master's thesis, Tokyo Institute of Technology / *Jul. 2020*
6. Nakatani Foundation Advanced Research Internship Program / *Jan.–Apr. 2019*
 - Fully funded research internship at Yale University
7. Nakatani Research & International Experiences for Students Fellowship / *Aug.–Sept. 2018*
 - Fully funded research internship at Rice University
8. Japan Student Services Organization scholarship for study abroad programs in Australia and Philippines / *Feb.–Mar. 2017; Mar. 2018*

RESEARCH SKILLS

- **Material Synthesis:** *E. coli* cultivation, centrifugation, ion-exchange chromatography (IEC), high-performance liquid chromatography (HPLC), metal-organic framework synthesis
- **NMR spectroscopy:** SSNMR experiments under ultra-fast MAS, SIMPSON, SPINEVOLUTION, Delta, TopSpin, NMRPipe
- **Spectroscopies:** UV-Vis spectroscopy, fluorescence spectroscopy, power X-ray diffraction, time-resolved terahertz spectroscopy, transient absorption spectroscopy
- **Electrochemistry:** cyclic voltammetry, photoelectrochemical measurements
- **Computer Skills:** Microsoft Office, Adobe Illustrator, Python, Origin, MATLAB, ChemDraw, GROMACS
- **Language Skills:** Japanese (native speaker), English (advanced) IELTS: 7.5,

ADDITIONAL EDUCATIONAL EXPERIENCE

Tokyo Institute of Technology, Kanagawa, Japan

- Global Scientists and Engineers Course / *Sept. 2016 – Aug. 2019*
- Japan Summer Program in Sustainable Development / *May–Aug. 2018*
 - Joint program with Georgia Institute of Technology for problem-based learning in sustainable development, including energy issues and transportation systems.
 - Visit to Fukushima Daiichi Nuclear Power Station.

Monash College, Melbourne, Australia

- Monash College Consortium Program / *Feb.–Mar. 2017*
 - Intensive English language course, including study of multiculturalism in Australia.

ACTIVITIES AND LEADERSHIP

Knowledge Investment Programs (KIP) Inc., Tokyo, Japan / Apr. 2018–Present

Active participant in discussion group of 70 undergraduate and graduate students and 50 workers

Executive Committee Member / Apr.–Dec. 2019

- Organized monthly discussion forums for university students on social issues, including politics and environmental problems.
- Compiled and wrote KIP's annual activities and events report.

UNICOM2019 Committee Leader / Jun.–Dec. 2019

- Organized 2019 University Students' International Conference, a three-day event in Japan's coastal area of Mie.
- Spearheaded events and activities, including visits to observe the fishing industry, volunteer experiences at a fishing port, and discussion forums on the sustainability of the fishing industry.

UNICOM2018 Committee Member / Jun.–Dec. 2018

- Organized 2018 University Students' International Conference, a three-day event in Mie's forest regions.
- Led program activities, including visits to observe the forest industry, volunteer trips to clear mountain trails, and discussion forums on the forest industry and environmental issues.