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| 若い男性の顔  自動的に生成された説明**Hideshi Ooka**  **RIKEN Center for Sustainable Resource Science（CSRS）**  **Biofunctional Catalyst Research Team  Research Scientist** |

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| Online Profile | |
| E-mail： | hideshi.ooka@riken.jp |
| Google Scholar： | <https://scholar.google.com/citations?user=tEC744kAAAAJ&hl=ja> |
|  | Total Citations：1887（As of Aug. 20, 2024） |
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| Japanese Research ID: | 90825994 |
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| Lab HP： | <http://rnakamura-lab.riken.jp/> |
| Personal HP： | <https://hideshiooka.com> |

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| Education |

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| 2006/4/1 – 2009/3/31 | High School Attached to Osaka Kyoiku University |
| 2009/4/1 – 2013/3/31 | University of Tokyo, Applied Chemistry (Bachelor) |
| 2013/4/1 – 2015/3/31 | University of Tokyo, Applied Chemistry（Master） |
| 2015/4/1 – 2018/3/31 | University of Tokyo, Applied Chemistry（PhD） |

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| **Professional Experience** |

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| 2018/4/1 – 2019/3/31 | RIKEN Postdoctoral Researcher “Oxygen Evolution Catalysis using Earth-Abundant Materials” |
| 2019/4/1 – 2020/9/31 | RIKEN Special Postdoctoral Researcher “Unraveling Catalytic Mechanisms using In-Situ Spectroscopy” |
| 2020/10 – present | RIKEN Research Scientist (Permanent) Development of Nonequilibrium Catalyst Theory |

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| Awards |

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| 2024/4/16 | RIKEN CSRS Incentive Award |
| 2021/1/18 | Best Special Postdoctoral Researcher Award |
| 2020/3/25 | RIKEN Oubu Award for Young Researchers |
| 2019/4/1 | RIKEN Special Postdoctoral Researcher |
| 2018/10/19 | Invited to JSPS SPD Interview |
| 2018/3/21 | University of Tokyo, Applied Chemistry Cum Laude |
| 2018/3/21 | University of Tokyo, MERIT Program Cum Laude |
| 2015/4/1 | JSPS DC1 Scholarship |
| 2013/10/21 | CSJ Chemistry Festival Poster Prize |

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| **Academic Publications (All Peer Reviewed)** |

**Original Papers: 24**

1. Yoko Chiba\*+, **Hideshi Ooka**\*+, Marie E. Wintzer, Nao Tsunematsu, Takehiro Suzuki, Naoshi Dohmae, Ryuhei Nakamura **"Diverse Phosphoserine Phosphatases Exhibit Maximum Activity at an Intermediate Binding Affinity in Accord With the Sabatier Principle of Catalysis"** *Angew. Chem. Int. Ed.*, **2024**, *63*, e202318635.

2. Shuang Kong, Ailong Li\*, Jun Long, Kiyohiro Adachi, Daisuke Hashizume, Qike Jiang, Kazuna Fushimi, **Hideshi Ooka**, Jianping Xiao\*, Ryuhei Nakamura\* **"Acid-Stable Manganese Oxides for Proton Exchange Membrane Water Electrolysis"** *Nat. Catal.*, **2024**, *7*, 252-261.

3. Ailong Li\*, Shuang Kong, Kiyohiro Adachi, **Hideshi Ooka**, Kazuna Fushimi, Qike Jiang, Hironori Ofuchi, Satoru Hamamoto, Masaki Oura, Kotaro Higashi, Takuma Kaneko, Tomoya Uruga, Naomi Kawamura, Daisuke Hashizume, Ryuhei Nakamura\* **"Atomically Dispersed Hexavalent Iridium Oxide From MnO2 Reduction for Oxygen Evolution Catalysis"** *Science*, **2024**, *384*, 666-670.

4. Hye-Eun Lee, Tomoyo Okumura, **Hideshi Ooka**, Kiyohiro Adachi, Takaaki Hikima, Kunio Hirata, Yoshiaki Kawano, Hiroaki Matsuura, Masaki Yamamoto, Masahiro Yamamoto, Akira Yamaguchi, Ji-Eun Lee, Ki Tae Nam, Daisuke Hashizume, Shawn McGlynn, Ryuhei Nakamura **"Osmotic Energy Conversion in Deep-Sea Hydrothermal Vents"** *Nat. Commun.*, **2024**, (*Accepted at Nat. Commun.*).

5. Koichi Yatsuzuka, Kiyohiro Adachi, Daisuke Hashizume, Ryuhei Nakamura\*, **Hideshi Ooka**\* **"A Non-Rate-Determining Redox Process Dictates the Oxygen Evolution Tafel Slope of MnO2"** *J. Phys. Chem. C*, **2023**, *127*, 22457-22463.

6. **Hideshi Ooka**\*, Yoko Chiba, Ryuhei Nakamura **"Thermodynamic Principle to Enhance Enzymatic Activity Using the Substrate Affinity"** *Nat. Commun.*, **2023**, *141*, 4860.

7. **Hideshi Ooka**\*, Marie E. Wintzer, Hirokazu Komatsu, Kiyohiro Adachi, Ailong Li, Shuang Kong, Daisuke Hashizume, Atsushi Mochizuki, Ryuhei Nakamura\* **"Dissipation Lifetime of Catalysis as a Dynamical System"** *ChemRxiv*, **2023**, (*Under review at JPCL*).

8. Ailong Li, Shuang Kong, Chenxi Guo, **Hideshi Ooka**, Kiyohiro Adachi, Daisuke Hashizume, Qike Jiang, Hongxian Han, Jianping Xiao\*, Ryuhei Nakamura\* **"Enhancing the Stability of Cobalt Spinel Oxide Towards Sustainable Oxygen Evolution in Acid"** *Nat. Catal.*, **2022**, *5*, 109-118.

9. Daoping He\*, **Hideshi Ooka**, Yamei Li, Yujeong Kim, Akira Yamaguchi, Kiyohiro Adachi, Daisuke Hashizume, Naohiro Yoshida, Sakae Toyoda, Sun Hee Kim, Ryuhei Nakamura\* **"Regulation of the Electrocatalytic Nitrogen Cycle Based on Sequential Proton-Electron Transfer"** *Nat. Catal.*, **2022**, *5*, 798-806.

10. Ji-Eun Lee, Akira Yamaguchi, **Hideshi Ooka**, Tomohiro Kazami, Masahiro Miyauchi, Norio Kitadai, Ryuhei Nakamura\* **"In Situ FTIR Study of CO2 Reduction on Inorganic Analogues of Carbon Monoxide Dehydrogenase"** *Chem. Commun.*, **2021**, *57*, 3267-3270.

11. **Hideshi Ooka**\*, Marie E. Wintzer, Ryuhei Nakamura **"Non-Zero Binding Enhances Kinetics of Catalysis: Machine Learning Analysis on the Experimental Hydrogen Binding Energy of Platinum"** *ACS Catal.*, **2021**, *11*, 6298-6303.

12. Daoping He, **Hideshi Ooka**, Yujeong Kim, Yamei Li, Fangming Jin\*, Sun Hee Kim\*, Ryuhei Nakamura\* **"Atomic-Scale Evidence for Highly Selective Electrocatalytic N- N Coupling on Metallic MoS2"** *Proc. Natl. Acad. Sci.*, **2020**, *117*, 31631-31638.

13. Yamei Li\*, Yoo Kyung Go, **Hideshi Ooka**, Daoping He, Fangming Jin, Sun Hee Kim\*, Ryuhei Nakamura\* **"Enzyme Mimetic Active Intermediates for Nitrate Reduction in Neutral Aqueous Media"** *Angew. Chem. Int. Ed.*, **2020**, *59*, 9744-9750.

14. Daoping He, **Hideshi Ooka**, Yamei Li, Fangming Jin\*, Ryuhei Nakamura\* **"Phase-Selective Hydrothermal Synthesis of Metallic MoS2 at High Temperature"** *Chem. Lett.*, **2019**, *58*, 5054-5058.

15. Ailong Li, **Hideshi Ooka**, Nadege Bonnet, Toru Hayashi, Yimeng Sun, Qike Jiang, Can Li, Hongxian Han\*, Ryuhei Nakamura\* **"Stable Potential Windows for Long-Term Electrocatalysis by Manganese Oxides Under Acidic Conditions"** *Angew. Chem. Int. Ed.*, **2019**, *58*, 5054-5058.

16. **Hideshi Ooka**\*, Ryuhei Nakamura **"Shift of the Optimum Binding Energy at Higher Rates of Catalysis"** *J. Phys. Chem. Lett.*, **2019**, *10*, 6706-6713.

17. Daoping He, Yamei Li, **Hideshi Ooka**, Yoo Kyung Go, Fangming Jin\*, Sun Hee Kim\*, Ryuhei Nakamura\* **"Selective Electrocatalytic Reduction of Nitrite to Dinitrogen Based on Decoupled Proton-Electron Transfer"** *J. Am. Chem. Soc.*, **2018**, *140*, 2012-2015.

18. Hirotaka Kakizaki, **Hideshi Ooka**, Toru Hayashi, Akira Yamaguchi, Nadege Bonnet-Mercier, Kazuhito Hashimoto, Ryuhei Nakamura\* **"Evidence That Crystal Facet Orientation Dictates Oxygen Evolution Intermediates on Rutile Manganese Oxide"** *Adv. Funct. Mater.*, **2018**, *28*, 1706319.

19. **Hideshi Ooka**, Kazuhito Hashimoto, Ryuhei Nakamura\* **"Design Strategy of Multi-Electron Transfer Catalysts Based on a Bioinformatic Analysis of Oxygen Evolution and Reduction Enzymes"** *Mol. Inform.*, **2018**, *37*, 1700139.

20. **Hideshi Ooka**, Akira Yamaguchi, Toshihiro Takashima, Kazuhito Hashimoto, Ryuhei Nakamura\* **"Efficiency of Oxygen Evolution on Iridium Oxide Determined From the pH Dependence of Charge Accumulation"** *J. Phys. Chem. C*, **2017**, *121*, 17873-17881.

21. **Hideshi Ooka**, Toshihiro Takashima, Akira Yamaguchi, Toru Hayashi, Ryuhei Nakamura\* **"Element Strategy of Oxygen Evolution Electrocatalysis Based on in Situ Spectroelectrochemistry"** *Chem. Commun.*, **2017**, *53*, 7149-7161.

22. **Hideshi Ooka**, Marta C. Figueiredo, Marc T. M. Koper\* **"Competition Between Hydrogen Evolution and Carbon Dioxide Reduction on Copper Electrodes in Mildly Acidic Media"** *Langmuir*, **2017**, *33*, 9307-9313.

23. **Hideshi Ooka**, Yuanqing Wang, Akira Yamaguchi, Makoto Hatakeyama, Shinichiro Nakamura, Kazuhito Hashimoto\*, Ryuhei Nakamura\* **"Legitimate Intermediates of Oxygen Evolution on Iridium Oxide Revealed by in Situ Electrochemical Evanescent Wave Spectroscopy"** *Phys. Chem. Chem. Phys.*, **2016**, *18*, 15199-15204.

24. **Hideshi Ooka**, Takumi Ishii, Kazuhito Hashimoto\*, Ryuhei Nakamura\* **"Light-Induced Cell Aggregation of Euglena Gracilis Towards Economically Feasible Biofuel Production"** *RSC Adv.*, **2014**, *4*, 20693-20698.

**Reviews: 3**

1. Thomas Kadyk\*, Jianping Xiao, **Hideshi Ooka**, Jun Huang, Kai S. Exner\* **"Material and Composition Screening Approaches in Electrocatalysis and Battery Research"** *Front. Energ. Res.*, **2021**, *9*, 227.

2. **Hideshi Ooka**\*, Jun Huang, Kai S. Exner **"The Sabatier Principle in Electrocatalysis: Basics, Limitations, and Extensions"** *Front. Energ. Res.*, **2021**, *9*, 155.

3. **Hideshi Ooka**, Shawn E. McGlynn, Ryuhei Nakamura\* **"Electrochemistry at Deep-Sea Hydrothermal Vents: Utilization of the Thermodynamic Driving Force Towards the Autotrophic Origin of Life"** *ChemElectroChem*, **2019**, *6*, 1316-1323.

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| **Presentations (Japanese Titles were Translated to English)** |

**Invited Presentations (13)**

1. **Hideshi Ooka "TBA"** Data Science Seminar, Meiji University, Tokyo (2024/09/02).

2. **Hideshi Ooka "Dynamical Systems Analysis of Catalysis using Experiments, Mathematics, and Machine Learning"** MIMS/CMMA Seminar on Self-Organization, Meiji University, Tokyo (2024/06/27).

3. **Hideshi Ooka "Acquiring Skills Toward Uncovering the Laws of Nature"** RIKEN Discovery Evening, RIKEN, Wako (2024/02/13).

4. **Hideshi Ooka "Research is Fun! Wait, is studying fun too!?"** Lecture as a Senior, Fuzoku Ikeda Junior High School, Osaka (2023/09/16).

5. **Hideshi Ooka "Kinetic Modeling of Enzymes and Electrocatalysts"** 2023 Workshop on Bidirectional Catalysis From Molecular Machines to Enzymes, Paris, France (2023/09/11).

6. **Hideshi Ooka "Development of Catalyst Theory and the Joys of Research from the Perspective of a Experimentalist Turned Theoretician"** MERIT-WINGS Seminar Camp, Lector Yugawara, Hakone (2023/08/06).

7. **Hideshi Ooka "Analysis and Experimental Verification of Dissipative Chemical Reaction Networks Towards Understanding Sustainability"** Math-Experimental Collaboration Towards an Overall Understanding of Catalysis, Enzymes, and the Ecosystem, RIKEN, Wako (2023/03/09).

8. **Hideshi Ooka "Using Machine Learning in Catalysis Theory"** Seminar # 212203, Technical Information Institute Seminar, Online (2022/12/08).

9. **Hideshi Ooka "Green Hydrogen Production via Water Electrolysis: Challenges and Prospects"** Public Lecture, City Hall, Wako (2021/12/07).

10. **Hideshi Ooka**, Ryuhei Nakamura **"From Thermodynamics to Kinetics: Predicting New Catalysts By Revisiting the Sabatier Principle"** 8th ELSI Symposium "Extending Views of Catalysis", Tokyo Institute of Technology, Japan (2020/02/03).  
**Keynote speaker on Early Career Researcher's Day**

11. **Hideshi Ooka**, Ryuhei Nakamura **"Shift of the Optimum Binding Energy at Higher Rates of Catalysis"** The 4th Solar Fuel Material Workshop, Seoul National University, Korea (2019/09/27).

12. **Hideshi Ooka "Study on Electrocatalysis based on Informatics and Electron Transfer Theory"** The 4th Catalyst Informatics Symposium, Iino Hall, Tokyo (2018/11/21).

13. **Hideshi Ooka "Element Strategy of Multi-Electron Transfer Catalysis: Lessons from the Oxygen Evolution Strategies of Iridium Oxide and Photosystem II"** Seminar at Nam Lab, Seoul National University, Korea (2018/06/05).

**Oral Presentations (26)**

1. **Hideshi Ooka "Kinetic Requirements to Sustain Chemical Reaction Networks in an Open System"** Japan Geoscience Union Meeting 2023, Makuhari Messe, Tokyo (2024/05/26).

2. Taiyo Tamura, **Hideshi Ooka**, Kosuke Fujishima **"Bioinformatic Analysis on the Relationship between the Binding Affinity and Catalytic Activity of Enzymes"** Japan Society for Bioscience, Biotechnology, and Agroscience 2024 Annual Meeting, Tokyo University of Agriculture, Tokyo (2024/03/26).

3. **Hideshi Ooka**, Ryuhei Nakamura **"Towards a Post-Sabatier Theory of Electrocatalysis: Realizing Activity and Stability"** The 104th CSJ Annual Meeting, Nihon University, Funabashi (2024/03/21).

4. **Hideshi Ooka**, Ryuhei Nakamura **"Advancements of Electrocatalysis Theory towards Realizing Activity and Stability"** The 91st ECSJ Annual Meeting, Nagoya University, Nagoya (2024/03/16).

5. **Hideshi Ooka**, Marie E. Wintzer, Ryuhei Nakamura **"Predicting the Operational Lifetime of Electrocatalysis"** 74th Annual Meeting of the International Society of Electrochemistry, Lyon, France (2023/09/08).

6. **Hideshi Ooka**, Marie E. Wintzer, Hirokazu Komatsu, Kiyohiro Adachi, Ailong Li, Shuang Kong, Daisuke Hashizume, Atsushi Mochizuki, Ryuhei Nakamura **"Predicting the Lifetime of Dissipative Chemical Reaction Networks"** 2023 Annual Meeting of the Japanese Society for Mathematical Biology, Nara Womens University, Nara (2023/09/04).

7. **Hideshi Ooka**, Yoko Chiba, Ryuhei Nakamura **"Mathematical Theory to Maximize Enzymatic Activity Under Thermodynamic Constraints"** 10th International Congress on Industrial and Applied Mathematics, Waseda University, Tokyo (2023/08/20).

8. **Hideshi Ooka "Theoretical Advancements towards Predicting the Activity and Stability of Electrocatalysts using Microkinetics and Applied Mathematics"** Seminar at Koper Lab, Leiden University, The Netherlands (2023/06/21).

9. **Hideshi Ooka "Theoretical Requirements for Active and Stable Anode Materials"** Magneto Special Anodes, Schiedam, The Netherlands (2023/06/20).

10. **Hideshi Ooka "Rationalizing the Influence of the Overpotential on the Activity and Stability of Electrocatalysts "** Seminar at Exner Lab, University of Duisberg-Essen, Germany (2023/06/16).

11. **Hideshi Ooka "Predicting the Autocatalytic Feedback for a General Chemical Reaction Network"** Japan Geoscience Union Meeting 2023, Makuhari Messe, Tokyo (2023/05/21).

12. **Hideshi Ooka**, Yoko Chiba, Ryuhei Nakamura **"Binding Affinity to Maximize Enzymatic Activity"** Electrochemical Society of Japan 90th Annual Meeting, Tohoku Institute of Technology, Sendai (2023/03/27).

13. **Hideshi Ooka "Introduction as an Experimentalist Turned Theoretician"** Lab-Theory Standing Talk, RIKEN, Wako (2023/03/16).  
**First seminar organized by iTHEMS to promote collaboration between experiments and theory.**

14. **Hideshi Ooka "Towards Quantitative Predictions of Chemical Reaction Networks"** CO World Kickoff Meeting, Tokyo Institute of Technology, Earth-Life Science Institute, Tokyo (2023/01/16).

15. **Hideshi Ooka "Balancing Thermodynamics and Kinetics to Achieve Maximum Rates in Catalysis"** iTHEMS Weekly Meeting, RIKEN, Wako (2020/01/17).

16. **Hideshi Ooka**, Ryuhei Nakamura **"Difference in the Binding Energy Which Optimizes the Rates and Overpotentials of Electrocatalysis"** 3rd International Solar Fuels Conference-Young, Hiroshima, Japan (2019/11/19).

17. **Hideshi Ooka**, Ryuhei Nakamura **"Catalyst Design Based on the Binding Energy"** Electrochemical Society of Japan Autumn Meeting, Yamanashi University, Kofu (2019/09/05).

18. **Hideshi Ooka**, Ryuhei Nakamura **"Element Strategy of Oxygen Evolution Electrocatalysis Based on the Reaction Mechanism of Manganese Oxide, Iron Oxide, and Iridium Oxide"** 2019 North American Catalysis Society Meeting, Chicago, USA (2019/06/23).

19. **Hideshi Ooka**, Ryuhei Nakamura **"Development Strategies of Oxygen Evolution Catalysts Based on the Reaction Kinetics of Iridium Oxide and Manganese Oxide"** The 3rd Solar Fuel Material Workshop, Osaka University, Japan (2018/03/13).

20. **Hideshi Ooka**, Ryuhei Nakamura **"From the d-band Model to Beyond: Development Strategies for Kinetically-Favorable Multi-Electron Transfer Catalysts"** The 3rd Solar Fuel Material Forum, Osaka University, Japan (2018/03/12).

21. **Hideshi Ooka**, Kazuhito Hashimoto, Ryuhei Nakamura **"Element Strategy of Multi-Electron Transfer Catalysis: Difference Between 3d and 5d Metals based on the Operando Spectroscopy of Mn, Fe, and Ir based Oxygen Evolution Catalysts"** Electrochemical Society of Japan Autumn Meeting, Nagasaki University, Nagasaki (2017/09/10).

22. **Hideshi Ooka 「Bioenergetic Restrictions on the Gene Structures of Photosynthetic and Respiratory　Enzymes」** RIKEN CSRS Interim Report, RIKEN, Japan (2015/11/26).

23. **Hideshi Ooka**, Akira Yamaguchi, Kazuhito Hashimoto, Ryuhei Nakamura **"Detection of Oxygen Evolution Intermediates Using In situ Optical Waveguide Spectroscopy"** Electrochemical Society of Japan 82nd Annual Meeting, Yokohama National University, Yokohama (2015/03/15).

24. **Hideshi Ooka**, Akira Yamaguchi, Kazuhito Hashimoto, Ryuhei Nakamura **"Detection of Oxygen Evolution Intermedates of Iridium Oxide Using Optical Waveguide Spectroscopy"** 3rd Meeting of Solid and Surface Photochemistry, Kyoto University, Kyoto (2014/12/16).

25. **Hideshi Ooka**, Akira Yamaguchi, Kazuhito Hashimoto, Ryuhei Nakamura **"Element Strategy of Water Splitting: Difference between Mn and Ir"** Electrochemical Society of Japan 81st Annual Meeting, Kansai University, Suita (2014/03/29).

26. **Hideshi Ooka**, Takumi Ishii, Ryuhei Nakamura, Kazuhito Hashimoto **"Wavelength Dependence of Euglena Photomotility"** Japan Society for Bioscience, Biotechnology, and Agrochemistry Annual Meeting, Tohoku University, Sendai (2013/03/24).

**Poster Presentations (23)**

1. Tamura Taiyo, **Hideshi Ooka**, Kosuke Fujishima **"Bioinformatic Analysis on the Relationship Between the Rate Constant and Substrate Binding Affinity of Enzymes"** 3rd Meeting of the Molecular Life Reactions FOREST Society, Okinawa Institute of Science and Technology, Okinawa (2024/06/17).

2. **Hideshi Ooka "Understanding Enzymatic Activity and Reversibility Using Microkinetic Models"** 3rd Meeting of the Molecular Life Reactions FOREST Society, Okinawa Institute of Science and Technology, Okinawa (2024/06/17).

3. Tomoharu Suda, **Hideshi Ooka**, Ryuhei Nakamura **"Chemical Reaction Networks from a Non-autonomous Viewpoint"** The 12th ELSI Symposium, Tokyo Institute of Technology, Earth-Life Science Institute, Tokyo (2024/01/09).

4. Taiyo Tamura, **Hideshi Ooka**, Kosuke Fujishima **"Bioinformatic Assessment on the Linear Scaling Relationship between the Binding Affinity and the Rate Constant of Enzymes"** The 12th ELSI Symposium, Tokyo Institute of Technology, Earth-Life Science Institute, Tokyo (2024/01/09).

5. **Hideshi Ooka "Autocatalytic Threshold to Sustain Chemical Reaction Networks in the Presence of Diffusion"** The 12th ELSI Symposium, Tokyo Institute of Technology, Earth-Life Science Institute, Tokyo (2024/01/09).

6. **Hideshi Ooka**, Marie E. Wintzer, Hirokazu Komatsu, Kiyohiro Adachi, Ailong Li, Shuang Kong, Daisuke Hashizume, Atsushi Mochizuki, Ryuhei Nakamura **"Theory towards Predicting the Lifetime of Electrocatalysis "** MRM2023, Kyoto International Conference Center, Kyoto (2023/12/16).

7. **Hideshi Ooka "Development of Non-Equilibrium Catalytic Network Theory"** FOREST-ARIM Joint Meeting, Osaka University, Osaka (2023/03/07).

8. **Hideshi Ooka**, Yoko Chiba, Ryuhei Nakamura **"Optimum Km to Maximize Enzymatic Activity"** 1st Meeting of the Molecular Life Reactions FOREST Society, Kanazawa University, Kanazawa (2023/02/27).

9. **Hideshi Ooka**, Ryuhei Nakamura **"Difference in the Binding Energy Which Optimizes the Rates and Overpotentials of Electrocatalysis"** 3rd International Solar Fuels Conference/International Conference on Artificial Photosynthesis 2019 (Joint symposium), Hiroshima, Japan (2019/11/20).

10. **Hideshi Ooka**, Ryuhei Nakamura **"Understanding Catalytic Efficiency based on the Topology of the Reaction Network"** RIKEN CSRS Interim Report, RIKEN, Japan (2019/11/06).

11. **Hideshi Ooka "Spectral Analysis Using Machine Learning for Advanced Catalysis Development"** The 5th CSRS-ITbM Joint Workshop, Nagoya University, Nagoya (2019/01/24).

12. **Hideshi Ooka**, Ryuhei Nakamura **"Element Strategy of Oxygen Evolution Catalysis Based on the Reaction Mechanism of Iridium Oxide"** The 6th International Symposium on Solar Fuels and Solar Cells, Dalian, China (2018/10/12).

13. **Hideshi Ooka**, Ryuhei Nakamura **"Informatics Approach for Understanding Multi-Electron Transfer Regulation"** Engineering Network Retreat 2018, Nihonbashi Life Science Hub, Tokyo (2018/02/28).

14. **Hideshi Ooka**, Ryuhei Nakamura **"Bioinformatics Approach for Understanding Biological Electron Transfer"** RIKEN CSRS Interim Report, RIKEN, Japan (2017/11/01).

15. **Hideshi Ooka**, Ryuhei Nakamura **"Asymmetry of Oxygen Evolution and Oxygen Reduction Catalysts Revealed by a Bioinformatic Analysis of Enzymatic Genes"** The 2nd Solar Fuel Material Workshop, Seoul National University, Korea (2017/02/23).

16. **Hideshi Ooka**, Ryuhei Nakamura **"Probing the Optimization Criteria of Biological Catalysts based on In-Silico Genetic Analysis of Phylogenetically Diverse Enzymes"** The 3rd CSRS-ITbM Joint Workshop, Nagoya University, Nagoya (2017/01/12).

17. **Hideshi Ooka**, Marc Koper, Ryuhei Nakamura **"Differentiating Between Thermodynamic and Kinetic Rate Determining Processes for Multi-Electron Transfer Catalysis Beyond Computational Simulations"** RIKEN CSRS Interim Report, RIKEN, Japan (2016/11/02).

18. **Hideshi Ooka**, Marc Koper **"Competition of Carbon Dioxide Reduction and Hydrogen Evolution on Copper Electrodes"** 67th Annual Meeting of the International Electrochemical Society, Den Haag, The Netherlands (2016/08/21).

19. **Hideshi Ooka**, Marc Koper **"Competition of Carbon Dioxide Reduction and Hydrogen Evolution on Copper Electrodes"** CINF Summer School 2016, Gilleleje, Denmark (2016/08/07).

20. **Hideshi Ooka**, Kazuhito Hashimoto, Ryuhei Nakamura **"The Asymmetry of Multi-Electron Transfer Processes at the Enzyme Gene Structure Level"** 3rd International Workshop on Microbial Life under Extreme Energy Limitation, Sandbjerg Manor, Denmark (2015/09/21).

21. **Hideshi Ooka**, Akira Yamaguchi, Kazuhito Hashimoto, Ryuhei Nakamura **"Evaluation of the Charge Accumulation Process During the Oxygen Evolution Reaction on Iridium Oxide"** 21st Symposium "Advances in Photocatalysis", University of Tokyo, Tokyo (2014/12/12).

22. **Hideshi Ooka**, Akira Yamaguchi, Kazuhito Hashimoto, Ryuhei Nakamura **"Charge Accumulation During Oxygen Evolution Catalysis on Iridium Oxide and Manganese Oxide"** International Conference on Artificial Photosynthesis (ICARP2014), Awajishima, Japan (2014/11/24).

23. **Hideshi Ooka**, Takumi Ishii, Ryuhei Nakamura, Kazuhito Hashimoto **"Study on Euglena Photomotility towards Microbial Biofuel Production"** The 3rd CSJ Chemistry Festa, Tower Hall Funabori, Tokyo (2013/10/21).

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| **Patents** |

1. Kazuhito Hashimoto, Ryuhei Nakamura, **Hideshi Ooka**, Iwao Ueda, Hitoshi Matsuda **"Method for concentrating microalga culture fluid and apparatus therefor"** WO2014136574A1 (Public).

2. Ryuhei Nakamura, **Hideshi Ooka**, Bonnet Nadege, Ailong Li, Shuang Kong, Hongxian Han **"Water electrolysis method and equipment, and method for determining the driving potential of water electrolysis"** JPWO2020032256A1 (Public).

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| **Awards (Japanese Titles were Translated to English)** |

1. **Incentive Award**, RIKEN CSRS (2024/04/16).  
**Achievement based on advancing the theory of enzyme kinetics in the 2023 Nat. Commun. paper.**

2. **Best SPDR Report**, RIKEN (2021/01/18).

3. **Ohbu Award for Young Researchers**, RIKEN (2020/03/25).

4. **Special Postdoctoral Researcher**, RIKEN (2019/04/01).

5. **Invitation to SPD Interview**, Japan Society for the Promotion of Science (2018/10/19).  
**Interview declined to accept RIKEN SPDR position**

6. **Cum Laude**, University of Tokyo, School of Engineering (2018/03/21).

7. **Merit Award (4 awardees out of 40 candidates)**, University of Tokyo Leading Graduate Program MERIT (2018/03/07).

8. **JSPS DC1 (no interview)**, Japan Society for the Promotion of Science (2015/04/01).

9. **CSJ Chemistry Festa Poster Prize**, Chemical Society of Japan (2013/10/21).

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| **Funding (Japanese Titles were Translated to English)** |

1. JST FOREST Program (Principal Investigator)  
 **"Developing the Theory of Non-Equilibrium Catalytic Reaction Networks"** (2022 April - 2029 March, 50,000,000 yen)

2. JSPS Kakenhi Early Career (Principal Investigator)  
 **"Predicting the Activity of Oxygen Evolution Electrocatalysts using Microkinetics and Machine Learning"** (2022 April - 2024 March, 4,680,000 yen)

3. JSPS Kakenhi Early Career (Principal Investigator)  
 **"Introducing Low Spin Electron Configuration to Enhance the Activity of 3d-Block Oxygen Evolution Catalysts"** (2020 April - 2022 March, 4,160,000 yen)

4. RIKEN Cluster for Science, Technology, and Innovation Hub RIKEN and Tohoku University Joint Research Program (Principal Investigator)  
 **"Using High Throughput DFT Calculations for Element Strategy of Catalysis"** (2022 April - 2023 March, 1,730,000 yen)

5. RIKEN Incentive Research Project (Principal Investigator)  
 **"Study on the Charge Accumulation Process Towards the Rational Development of Earth-Abundant Oxygen Evolution Catalysts"** (2018 April - 2020 March, 1,700,000 yen)

6. RIKEN CSRS Next Generation Acceleration Research Program (Principal Investigator)  
 **"Understanding Gene Regulation based on the Informational Value of mRNA-Protein Interactions"** (2021 April - 2023 March, 2,000,000 yen)

7. JSPS Kakenhi Transformative A (Co-Investigator)  
 **"Chemistry: Demonstration of Prebiotic Metabolism in a CO-Rich Environment"** (2022 April - 2027 March, 252,810,000 yen)

8. JSPS Kakenhi A (Co-Investigator)  
 **"Regulation of Catalytic Reaction Networks towards Realizing Stable Oxygen Evolution Catalysts"** (2022 April - 2025 March, 30,350,000 yen)