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| **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：2287（As of Jan. 28th, 2025） |
|  | h-index：18 （As of Aug. 20, 2024） |
| Japanese Researcher ID: | 90825994 |
| ORCID: | <https://orcid.org/0000-0002-6921-6796> |
| 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: 26**

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| 1. | **Hideshi Ooka**\*, Tomoharu Suda, Koichi Yatsuzuka, Ryuhei Nakamura "Thermoneutrality is Not Necessary to Maximize Oxygen Evolution Reaction Rates" ***ChemSusChem***, **2025**, *18*, e202402625. [(URL)](https://chemistry-europe.onlinelibrary.wiley.com/doi/epdf/10.1002/cssc.202402625) |

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| 2. | Mayumi Seto\*, Risa Sasaki, **Hideshi Ooka**, Ryuhei Nakamura "Thermodynamics Underpinning the Microbial Community-Level Nitrogen Energy Metabolism" ***Environ. Microbiol.***, **2025**, *27*, e70055. [(URL)](https://enviromicro-journals.onlinelibrary.wiley.com/doi/full/10.1111/1462-2920.70055) |

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| 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. [(URL)](https://www.science.org/doi/10.1126/science.adg5193) |

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| 4. | **Hideshi Ooka**\*, Marie E. Wintzer, Hirokazu Komatsu, Tomoharu Suda, Kiyohiro Adachi, Ailong Li, Shuang Kong, Daisuke Hashizume, Atsushi Mochizuki, Ryuhei Nakamura\* "Microkinetic Model to Rationalize the Lifetime of Electrocatalysis: Tradeoff Between Activity and Stability" ***J. Phys. Chem. Lett.***, **2024**, *15*, 10079-10085. [(URL)](https://doi.org/10.1021/acs.jpclett.4c02162) |

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| 5. | 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**, *15*, 8193. [(URL)](https://www.nature.com/articles/s41467-024-52332-3) |

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| 6. | 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. [(URL)](https://www.nature.com/articles/s41929-023-01091-3) |

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| 7. | 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. [(URL)](https://onlinelibrary.wiley.com/doi/full/10.1002/anie.202318635) |

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| 8. | **Hideshi Ooka**\*, Yoko Chiba, Ryuhei Nakamura "Thermodynamic Principle to Enhance Enzymatic Activity Using the Substrate Affinity" ***Nat. Commun.***, **2023**, *141*, 4860. [(URL)](https://www.nature.com/articles/s41467-023-40471-y) |

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| 9. | 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. [(URL)](https://pubs.acs.org/doi/10.1021/acs.jpcc.3c04380) |

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| 10. | 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. [(URL)](https://www.nature.com/articles/s41929-022-00833-z) |

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| 11. | 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. [(URL)](https://www.nature.com/articles/s41929-021-00732-9) |

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| 12. | **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. [(URL)](https://pubs.acs.org/doi/full/10.1021/acscatal.1c01018) |

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| 13. | 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. [(URL)](https://pubs.rsc.org/en/content/articlehtml/2021/cc/d0cc07318k) |

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| 14. | 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. [(URL)](https://www.pnas.org/doi/abs/10.1073/pnas.2008429117) |

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| 15. | 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. [(URL)](https://onlinelibrary.wiley.com/doi/abs/10.1002/ange.201813361) |

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| 16. | **Hideshi Ooka**\*, Ryuhei Nakamura "Shift of the Optimum Binding Energy at Higher Rates of Catalysis" ***J. Phys. Chem. Lett.***, **2019**, *10*, 6706-6713. [(URL)](https://pubs.acs.org/doi/abs/10.1021/acs.jpclett.9b01796) |

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| 17. | 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. [(URL)](https://onlinelibrary.wiley.com/doi/abs/10.1002/ange.201813361) |

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| 18. | 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. [(URL)](https://academic.oup.com/chemlett/article-abstract/48/8/828/7339142) |

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| 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. [(URL)](https://onlinelibrary.wiley.com/doi/abs/10.1002/minf.201700139) |

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| 20. | 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. [(URL)](https://onlinelibrary.wiley.com/doi/abs/10.1002/adfm.201706319) |

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| 21. | 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. [(URL)](https://pubs.acs.org/doi/abs/10.1021/jacs.7b12774) |

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| 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. [(URL)](https://pubs.acs.org/doi/abs/10.1021/acs.langmuir.7b00696) |

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| 23. | **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. [(URL)](https://pubs.rsc.org/en/content/articlehtml/2017/cc/c7cc02204b) |

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| 24. | **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. [(URL)](https://pubs.acs.org/doi/abs/10.1021/acs.jpcc.7b03749) |

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| 25. | **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. [(URL)](https://pubs.rsc.org/en/content/articlehtml/2016/cp/c6cp02385a) |

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| 26. | **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. [(URL)](https://pubs.rsc.org/en/content/articlehtml/2014/ra/c4ra02101k) |

**Reviews: 3**

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| 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. [(URL)](https://www.frontiersin.org/articles/10.3389/fenrg.2021.699376/full) |

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| 2. | **Hideshi Ooka**\*, Jun Huang, Kai S. Exner "The Sabatier Principle in Electrocatalysis: Basics, Limitations, and Extensions" ***Front. Energ. Res.***, **2021**, *9*, 155. [(URL)](https://www.frontiersin.org/articles/10.3389/fenrg.2021.654460/full) |

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| 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. [(URL)](https://chemistry-europe.onlinelibrary.wiley.com/doi/abs/10.1002/celc.201801432) |

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

**Invited Presentations (14)**

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| 1. | **Hideshi Ooka** "Mathematical Models to Improve the Reaction Rates of Catalysis" Basics of Engineering Seminar, Kindai University, Hiroshima (2025/02/12). |

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| 2. | **Hideshi Ooka** "Materials Design in the Era of Data Science: Combining Exeriments, Mathematics, and Informatics" Data Science Seminar, Meiji University, Tokyo (2024/09/02). |

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| 3. | **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). |

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| 4. | **Hideshi Ooka** "Acquiring Skills Toward Uncovering the Laws of Nature" RIKEN Discovery Evening, RIKEN, Wako (2024/02/13). |

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| 5. | **Hideshi Ooka** "Research is Fun! Wait, is studying fun too!?" Lecture as a Senior, Fuzoku Ikeda Junior High School, Osaka (2023/09/16). |

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| 6. | **Hideshi Ooka** "Kinetic Modeling of Enzymes and Electrocatalysts" 2023 Workshop on Bidirectional Catalysis From Molecular Machines to Enzymes, Paris, France (2023/09/11). |

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| 7. | **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). |

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| 8. | **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). |

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| 9. | **Hideshi Ooka** "Using Machine Learning in Catalysis Theory" Seminar # 212203, Technical Information Institute Seminar, Online (2022/12/08). |

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| 10. | **Hideshi Ooka** "Green Hydrogen Production via Water Electrolysis: Challenges and Prospects" Public Lecture, City Hall, Wako (2021/12/07). |

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| 11. | **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** |

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| 12. | **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). |

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| 13. | **Hideshi Ooka** "Study on Electrocatalysis based on Informatics and Electron Transfer Theory" The 4th Catalyst Informatics Symposium, Iino Hall, Tokyo (2018/11/21). |

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| 14. | **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 (33)**

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| 1. | Sahaya Vijay Jeyaraj, Hirokazu Komatsu, Ryuhei Nakamura, **Hideshi Ooka** "Calculating the Lifetime of Autocatalytic Chemical Reaction Networks" Asian Conference for Mathematical Biology, Kyoto Terrsa, Kyoto (2025/07/07). |

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| 2. | **Hideshi Ooka**, Hirokazu Komatsu, Sahaya Vijay Jeyaraj, Ryuhei Nakamura "Timescale Decomposition of Linear Chemical Reaction Networks" Asian Conference for Mathematical Biology, Kyoto Terrsa, Kyoto (2025/07/07). |

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| 3. | **Hideshi Ooka**, Sahaya Vijay Jeyaraj, Ryuhei Nakamura "Analyzing the Stability of Autocatalytic Chemical Reaction Networks Based on their Amplification Rate" Japan Geoscience Union Meeting 2023, Makuhari Messe, Chiba (2025/05/29). |

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| 4. | **Hideshi Ooka** "Timescale decomposition of chemical reaction networks and implications towards autocatalysis" Autocatalysis in Reaction Networks, Zoom, Zoom (2025/04/03). |

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| 5. | **Hideshi Ooka** "10,000 Fold Acceleration of Materials Evaluation towards Widespread Implementation of Green Hydrogen" Tsukuba Meet Up Day, Tsukuba International Congress Center, Tsukuba (2025/03/19). |

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| 6. | **Hideshi Ooka**, Ryuhei Nakamura "Predicting Electrocatalytic Lifetime Using Microkinetics" The 92nd ECSJ Annual Meeting, Tokyo University of Agriculture and Technology, Tokyo (2025/03/18). |

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| 7. | **Hideshi Ooka**, Marie Wintzer, Hirokazu Komatsu, Kiyohiro Adachi, Ailong Li, Shuang Kong, Daisuke Hashizume, Atsushi Mochizuki, Ryuhei Nakamura "Dynamical Systems Analysis on Electrocatalytic Lifetime" Japan Society for Industrial and Applied Mathematics, Kyoto University, Kyoto (2024/09/14). |

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| 8. | **Hideshi Ooka** "Kinetic Requirements to Sustain Chemical Reaction Networks in an Open System" Japan Geoscience Union Meeting 2023, Makuhari Messe, Chiba (2024/05/26). |

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| 9. | 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). |

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| 10. | **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). |

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| 11. | **Hideshi Ooka**, Ryuhei Nakamura "Advancements of Electrocatalysis Theory towards Realizing Activity and Stability" The 91st ECSJ Annual Meeting, Nagoya University, Nagoya (2024/03/16). |

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| 12. | **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). |

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| 13. | **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). |

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| 14. | **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). |

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| 15. | **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). |

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| 16. | **Hideshi Ooka** "Theoretical Requirements for Active and Stable Anode Materials" Magneto Special Anodes, Schiedam, The Netherlands (2023/06/20). |

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| 17. | **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). |

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| 18. | **Hideshi Ooka** "Predicting the Autocatalytic Feedback for a General Chemical Reaction Network" Japan Geoscience Union Meeting 2023, Makuhari Messe, Tokyo (2023/05/21). |

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| 19. | **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). |

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| 20. | **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.** |

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| 21. | **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). |

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| 22. | **Hideshi Ooka** "Balancing Thermodynamics and Kinetics to Achieve Maximum Rates in Catalysis" iTHEMS Weekly Meeting, RIKEN, Wako (2020/01/17). |

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| 23. | **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). |

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| 24. | **Hideshi Ooka**, Ryuhei Nakamura "Catalyst Design Based on the Binding Energy" Electrochemical Society of Japan Autumn Meeting, Yamanashi University, Kofu (2019/09/05). |

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| 25. | **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). |

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| 26. | **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). |

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| 27. | **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). |

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| 28. | **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). |

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| 29. | **Hideshi Ooka** 「Bioenergetic Restrictions on the Gene Structures of Photosynthetic and Respiratory　Enzymes」 RIKEN CSRS Interim Report, RIKEN, Japan (2015/11/26). |

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| 30. | **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). |

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| 31. | **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). |

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| 32. | **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). |

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| 33. | **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)**

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| 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). |

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| 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). |

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| 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). |

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| 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). |

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| 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). |

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| 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). |

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

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| 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). |

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| 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). |

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| 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). |

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

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| 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). |

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| 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). |

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

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| 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). |

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| 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). |

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| 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). |

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| 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). |

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| 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). |

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| 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). |

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| 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). |

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| 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). |

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| 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** |

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

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| 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)** |

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

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

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

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

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

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

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

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

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

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

**Principal Investigator**

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| 1. | JSPS Kakenhi Kiban B  "Improving the Stability of Oxygen Evolution Electrocatalysts based on Theoretical Lifetime Predictions and Reaction Condition Optimization"  (2025 - 2029, 14,400,000 yen) |

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| 2. | JST ALCA-Next(FS)  "Predicting Electrocatalytic Lifetime from Accelerated Aging Tests"  (2024 - 2026, 5,000,000 yen) |

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| 3. | JST FOREST Program  "Developing the Theory of Non-Equilibrium Catalytic Reaction Networks"  (2022 - 2029, 50,000,000 yen) |

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

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| 5. | RIKEN Cluster for Science, Technology, and Innovation Hub RIKEN and Tohoku University Joint Research Program  "Using High Throughput DFT Calculations for Element Strategy of Catalysis"  (2022 - 2023, 1,730,000 yen) |

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

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| 7. | JSPS Kakenhi Early Career  "Introducing Low Spin Electron Configuration to Enhance the Activity of 3d-Block Oxygen Evolution Catalysts"  (2020 - 2022, 4,160,000 yen) |

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| 8. | RIKEN Incentive Research Project  "Study on the Charge Accumulation Process Towards the Rational Development of Earth-Abundant Oxygen Evolution Catalysts"  (2018 - 2020, 1,700,000 yen) |

**Co-Investigator**

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| 1. | MEXT Data Creation and Utilization-Type Material R and D Project (DxMT)  "Digital Transformation Initiative for Green Energy Materials (DX-GEM)"  (2025 - 2028, 21,000,000 yen) |

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| 2. | JSPS Kakenhi Transformative A  "Chemistry: Demonstration of Prebiotic Metabolism in a CO-Rich Environment"  (2022 - 2027, 252,810,000 yen) |

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| 3. | JSPS Kakenhi Kiban A  "Regulation of Catalytic Reaction Networks towards Realizing Stable Oxygen Evolution Catalysts"  (2022 - 2025, 30,350,000 yen) |