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| **大岡 英史**  **理化学研究所 環境資源科学研究センター　（CSRS）**  **生体機能触媒研究チーム　研究員** |

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| **学歴** |

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| 2006/4/1 – 2009/3/31 | 大阪教育大学 附属高等学校 池田校舎 |
| 2009/4/1 – 2013/3/31 | 東京大学 工学部 応用化学科 卒業（学士） |
| 2013/4/1 – 2015/3/31 | 東京大学 工学系研究科 応用化学専攻 修了（修士） |
| 2015/4/1 – 2018/3/31 | 東京大学 工学系研究科 応用化学専攻 修了（博士） |

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| **職歴・研究内容** |

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| 2018/4/1 – 2019/3/31 | 理化学研究所 特別研究員 「普遍金属元素による酸素発生触媒に関する研究」 |
| 2019/4/1 – 2020/9/31 | 理化学研究所 基礎科学特別研究員（JSPS SPD辞退） 「In-situ分光による触媒反応機構の解明」 |
| 2020/10 –現職 | 理化学研究所 研究員（定年制） 「非平衡触媒反応理論の開拓」 |

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| **受賞歴等** |

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| 2024/4/16 | 理化学研究所 環境資源科学研究センター 奨励賞 受賞 |
| 2021/1/18 | 理化学研究所 基礎科学特別研究員 成果報告会 優秀賞 |
| 2020/3/25 | 理化学研究所 桜舞賞 受賞 |
| 2019/4/1 | 理化学研究所 基礎科学特別研究員 採用 |
| 2018/10/19 | 日本学術振興会 特別研究員 SPD面接辞退 |
| 2018/3/21 | 東京大学 工学系研究科長賞 (専攻内で最優秀博士論文) |
| 2018/3/21 | 東京大学 MERIT賞 (学年40人から最優秀者4人) |
| 2015/4/1 | 日本学術振興会 特別研究員 DC1 採用 |
| 2013/10/21 | CSJ化学フェスタ ポスター賞 |

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| **学術論文 (査読あり)** |

**原著論文: 26 報**

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| 1. | Mayumi Seto\*, Risa Sasaki, **Hideshi Ooka**, Ryuhei Nakamura"Thermodynamics Underpinning the Microbial Community-Level Nitrogen Energy Metabolism" ***Environ. Microbiol.***, **2025**, *27*, e70055. |

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| 2. | **Hideshi Ooka**\*, Tomoharu Suda, Koichi Yatsuzuka, Ryuhei Nakamura"Thermoneutrality is Not Necessary to Maximize Oxygen Evolution Reaction Rates" ***ChemSusChem***, **2025**, (*Early View*). |

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| 3. | 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. |

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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. |

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| 5. | 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. |

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| 6. | 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. |

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| 7. | 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. |

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| 8. | 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. |

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| 9. | **Hideshi Ooka**\*, Yoko Chiba, Ryuhei Nakamura"Thermodynamic Principle to Enhance Enzymatic Activity Using the Substrate Affinity" ***Nat. Commun.***, **2023**, *141*, 4860. |

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| 10. | 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. |

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| 11. | 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. |

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| 12. | 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. |

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| 13. | **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. |

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| 14. | 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. |

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| 15. | 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. |

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| 16. | 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. |

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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. |

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| 18. | **Hideshi Ooka**\*, Ryuhei Nakamura"Shift of the Optimum Binding Energy at Higher Rates of Catalysis" ***J. Phys. Chem. Lett.***, **2019**, *10*, 6706-6713. |

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| 19. | 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. |

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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. |

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| 21. | **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. |

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| 22. | **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. |

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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. |

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| 24. | **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. |

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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. |

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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. |

**総説: 3 報**

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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. |

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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. |

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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. |

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| **学会発表** |

**【招待講演】**

|  |  |
| --- | --- |
| 1. | **大岡英史**「触媒反応速度の向上に向けた数理モデルの開発」 近畿大学基礎工学セミナー, 近畿大学, 広島 (2025/02/12). |

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| 2. | **大岡英史**「情報科学の時代における材料開発：実験・数理・情報の相補的な連携」 研究室セミナー, 明治大学, 生田キャンパス (2024/09/02). |

|  |  |
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| 3. | **大岡英史**「実験・数理・機械学習による触媒反応の動力学解析」 MIMS/CMMA自己組織化セミナー, 明治大学, 東京 (2024/06/27). |

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| 4. | **大岡英史**「自然界の法則を見つけるための自分磨き」 理研Discovery Evening, 理化学研究所, 和光 (2024/02/13). |

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| 5. | **大岡英史**「研究って楽しい！え、勉強も楽しいの？」 先輩の授業を受けよう, 大阪教育大学附属中学校池田校舎, 大阪 (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. | **大岡英史**「触媒理論の開拓：実験出身の理論研究者から見た研究の楽しさ」 MERIT-WINGS合宿, レクトーレ湯河原, 箱根 (2023/08/06). |

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| 8. | **Hideshi Ooka**"Analysis and Experimental Verification of Dissipative Chemical Reaction Networks Towards Understanding Sustainability" 触媒・酵素・エコシステムの統合理解に向けた数理実験融合, RIKEN, Wako (2023/03/09). |

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| 9. | **大岡英史**「実験データに基づく触媒反応パラメーターの推定：活性、選択性への応用」 セミナー #212203, 技術情報協会, Online (2022/12/08). |

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| 10. | **大岡英史**「水の電気分解による水素製造：現状と未来」 和光市民大学, 和光市役所, 和光 (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). **基調講演（若手枠）** |

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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. | **大岡英史**「情報科学と電子移動論に基づく電極触媒に関する研究」 第４回キャタリストインフォマティクスシンポジウム, イイノホール, 東京 (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). |

**【口頭発表】**

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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. | **大岡英史**、Sahaya Vijay Jeyaraj、中村龍平「自己触媒の増幅率に基づく化学反応ネットワークの安定性解析」 日本地球惑星科学連合2025年大会, 幕張メッセ, 千葉 (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. | **大岡英史**「グリーン水素の社会実装に向けた材料評価の１万倍加速」 つくばMeetUpDay, つくば国際会議場, つくば (2025/03/19). |

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| 6. | **大岡英史**、中村龍平「速度論による電極触媒の寿命予測」 電気化学会第92回大会, 東京農工大学, 小金井 (2025/03/18). |

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| 7. | **大岡英史**、Marie Wintzer、小松弘和、足立精宏、Ailong Li、Shuang Kong、橋爪大輔、望月敦史、中村龍平「電極触媒の劣化速度に関する力学系モデルの構築」 応用数理学会, 京都大学, 京都 (2024/09/14). |

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| 8. | **大岡英史**、須田智晴、中村龍平「開放系化学反応ネットワークの維持に必要な速度論的要件」 日本地球惑星科学連合2024年大会, 幕張メッセ, 千葉 (2024/05/26). |

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| 9. | 田村太陽、**大岡英史**、藤島皓介「酵素活性と基質への結合親和性に関するバイオインフォマティクス解析」 日本農芸化学会2024年度大会, 東京農業大学, 東京 (2024/03/26). |

|  |  |
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| 10. | **大岡英史**、中村龍平「Post-Sabatierを目指した電極触媒理論の開拓：活性と安定性の両立に向けて」 日本化学会春季年会, 日本大学, 船橋 (2024/03/21). |

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| 11. | **大岡英史**、中村龍平「活性と安定性の向上に向けた電極触媒理論の開拓」 電気化学会第91回大会, 名古屋大学, 名古屋 (2024/03/14). |

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| 12. | **Hideshi Ooka**"Acquiring Skills Toward Uncovering the Laws of Nature" RIKEN Discovery Evening, RIKEN, Wako (2024/02/13). |

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| 13. | **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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| 14. | **大岡英史**、Marie E. Wintzer、小松弘和、足立精宏、李愛龍、孔爽、橋爪大輔、望月敦史、中村龍平「散逸化学反応ネットワークの寿命予測」 2023年度日本数理生物学会年会, 奈良女子大学, 奈良 (2023/09/04). |

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| 15. | **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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| 16. | **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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| 17. | **Hideshi Ooka**"Theoretical Requirements for Active and Stable Anode Materials" Magneto Special Anodes, Schiedam, The Netherlands (2023/06/20). |

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| 18. | **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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| 19. | **大岡英史**「一般的な化学反応ネットワークにおける自己触媒増幅率の予測」 日本地球惑星科学連合2023年大会, 幕張メッセ, 千葉 (2023/05/21). |

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| 20. | **大岡英史**、千葉洋子、中村龍平「酵素活性を最大化する結合性相互作用の予測」 電気化学会第90回大会, Tohoku Institute of Technology, Sendai (2023/03/27). |

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| 21. | **Hideshi Ooka**"Introduction as an Experimentalist Turned Theoretician" Lab-Theory Standing Talk, RIKEN, Wako (2023/03/16). **理論と実験の融合促進に向けた理研iTHEMSの第1回のセミナー** |

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| 22. | **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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| 23. | **Hideshi Ooka**"Balancing Thermodynamics and Kinetics to Achieve Maximum Rates in Catalysis" iTHEMS Weekly Meeting, RIKEN, Wako (2020/01/17). |

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| 24. | **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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| 25. | **大岡英史**、中村龍平「結合エネルギーから見た電極触媒の開発」 電気化学会秋季大会, 山梨大学, 甲府 (2019/09/05). |

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| 26. | **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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| 27. | **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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