KAIST Korea Advanced Institute of Science and Technology

Dongyeon Kim

dyk0906@kaist.ac.kr

EDUCATION

Ph.D. Mechanical Engineering, KAIST, Korea, 2025
(Advisor : Prof. Kang Taek Lee)

M.S. Mechanical Engineering, Sungkyunkwan University, Korea, 2021
(Advisor : Prof. Kyunghoon Kim)

B.S. Mechanical Engineering, Inha University, Korea, 2018
(Summa cum laude)

PROFESSIONAL EXPERIENCE

2025 – present, **Postdoctoral Fellow**
InnoCORE PRISM-AI Center, KAIST, Korea

2020 – 2021, **Research Assistant**
Advanced Textile R&D Department, KITECH, Korea

2018 – 2019, **Production Engineer**
Production Development Center,
Chassis Production Technology Department, Hyundai MOBIS, Korea

PUBLICATIONS

*(Notes: * indicates corresponding author(s), # indicates equal contribution to the work.)*

i) First Author Papers (8)

8. **D. Kim#**, Y. Kang#, H. Kim, S. Oh, S. Jang, M. Lee, Z. F. Lee, G.-D. Sim, K. T. Lee*, "Sub-1000 °C Sintering of Protonic Ceramic Electrochemical Cells via Microwave-Driven Vapor Phase Diffusion", ***Advanced Materials*****, 2506905, (2025)**.

7. J. H. Lee#, **D. Kim#**, Y. G. Lee, Y. Kim, K. Shin, H. J. Lee, H. An, J. Y. Cheong, S. -J. Choi, H. Y. Kim, J. Choi, J. S. Lee, K, R, Yoon*, T. G. Yun*, "Sustainable Electrical Energy Harvesting via Atmospheric Water Collection Using Dual-MOF Systems", ***Composite Part B: Engineering***, **112574, (2025).**

6. S. Ahn#, **D. Kim#**, I. Jeong, H. Kang, I. Lim, G. Heo, D. -K. Lim, J. K. Kim, K. -M. Roh, B. Koo, J. H. Kim*, K. T. Lee*, W. Jung*, "Promotion of Reversible Fuel-Power Generation in Protonic Ceramic Electrochemical Cell via Water-Mediated Ex-Solution", ***ACS Energy Letters*****, 10, 4948, (2025).**

5. **D. Kim#**, I. Jeong#, S. Ahn#, S. Oh, H.-N. Im, H. Bae, S.-J. Song*, C.-W. Lee*, W. Jung*, K. T. Lee*, "On the Role of Bimetal-doped $BaCoO_{3-\delta}$ Perovskites as Highly Active Oxygen Electrodes of Protonic Ceramic Electrochemical Cells", ***Advanced Energy Materials*****, 14, 2304059, (2024)**.

4. **D. Kim#**, T. G. Yun#, J. H. Lee#, K. R. Yoon*, K. Kim*, "Rational design of conductive metal–organic frameworks and aligned carbon nanofibers for enhancing the performance of flexible supercapacitors", ***Nanoscale Advances,*** **6, 1900, (2024).**

3. J. H. Kim#, **D. Kim#**, S. Ahn#, K. J. Kim, S. Jeon, D.-K, Lim, J. K. Kim, U. Kim, H.-N. Im, B. Koo, K. T. Lee*, W. Jung*, "An Universal Oxygen-Electrode for Reversible Solid Oxide Electrochemical Cells at Reduced Temperatures", ***Energy & Environmental Science*****, 16, 3803, (2023).**

2. N. Tsvetkov#, **D. Kim#**, I. Jeong#, J. H. Kim#, S. Ahn, K. T. Lee*, W. Jung*, "Advances in Materials and Interface Understanding in Protonic Ceramic Fuel Cells", ***Advanced Materials Technologies***, **8, 2201075, (2023).**

1. **D. Kim#,** K. T. Bae#, K. J. Kim, H. -N. Im, S. Jang, S. Oh, S. W. Lee, T. H. Shin, K. T. Lee*, "High-Performance Protonic Ceramic Electrochemical Cells", ***ACS Energy Letters***, **7, 2393, (2022).**

ii) Co-Author Papers (7)

7. H. Kim#, I. Jeong#, S. Oh, **D. Kim**, K. T. Lee*, "High-Entropy Perovskite Nanofibers for Bifunctional Air Electrodes in Reversible Protonic Ceramic Electrochemical Cells", ***Advanced Functional Materials*****, e17768, (2025).**

6. S. Oh#, I. Jeong#, **D. Kim**, H. Kim, K. -M. Roh, K. T. Lee*, "Unveiling Entropy-Driven Performance Enhanced in Double Perovskite Oxygen Electrodes for Protonic Ceramic Electrochemical Cells", ***Advanced Energy Materials*****, e03176, (2025).**

5. S. Jang#, Y. Kang #, K. T. Bae, S. H. Park, Y. J. Park, **D. Kim**, H. Yu, H. Kim, S. Yu, K. T. Lee*, "Digital Twin of Solid Oxide Electrochemical Cells: From 3D Microstructure Reconstruction to Multiphysics Modeling", ***Advanced Energy Materials*, e03842, (2025).**

4. S. Oh#, H. Kim#, I. Jeong#, **D. Kim**, H. Yu, K. T. Lee*, "Recent Progress in Oxygen Electrodes for Protonic Ceramic Electrochemical Cells", ***Journal of the Korean Ceramic Society*, 6, 224, (2024).**

3. S. Oh, **D. Kim**, H. J. Ryu*, K. T. Lee*, "A Novel High-Entropy Perovskite Electrolyte with Improved Proton Conductivity and Stability for Reversible Protonic Ceramic Electrochemical Cells", ***Advanced Functional Materials*, 34, 2311426. (2024).**

2. T. G. Yun*, J. Bae, H. G. Nam, **D. Kim**, K. R. Yoon, S. M. Han*, I. D. Kim*, "Ion-Permselective Conducting Polymer-based Electrokinetic Generators with Maximized Utility of Green Water", ***Nano Energy*, 94, 106946, (2022).**

1. D. Kim#, I. Jeong#, K. J. Kim, K. T. Bae, **D. Kim**, J. Koo, H. Yu, K. T. Lee*, "A Brief Review of Heterostructure Electrolytes for High-Performance Solid Oxide Fuel Cells at Reduced Temperatures", ***Journal of the Korean Ceramic Society*, 59, 131, (2022).**

HONORS AND AWARDS

2025, **InnoCORE Postdoctoral Fellow**, Ministry of Science and ICT, Korea

2024, **Outstanding Paper Award**, 2024 KAIST Graduate Students Outstanding Paper Awards

2024, **Oral Presentation Award**, KCerS-ECerS Joint Symposium at 2024 KCERS Fall Meeting

2024, **Poster Presentation Award**, 2024 KCERS Spring Meeting

2024, **30th Humantech Paper Award**, Samsung Electronics

2023, **Oral Presentation Award**, ACerS Korea Chapter at 2023 KCERS Fall Meeting

2023, **Graduate Scholarship in Future Industry**, Hyundai Motor Chung Mong-Koo Foundation

2023, **Samsung Electro-Mechanics Ceramist Award**, 2023 KCERS Spring meeting

ACADEMIC ACTIVITY

2025, **Junior Board Member** at '2025 KCERS Spring Meeting'

PATENTS

13.Kang Taek Lee, **Dongyeon Kim**, Hyeonggeun Kim, Mincheol Lee, Seeun Oh, "Large-Area Protonic Ceramic Fuel Cell and its method for preparing the Same", Application No. 10-2025-0073550 (Filing date : 2025. 06. 05)

12. Kang Taek Lee, Kang Yong Lee, Joongmyeon Bae, Seeun Oh, Hyeonggeun Kim, Mincheol Lee, **Dongyeon Kim**, "High-entropy perovskite-based catalyst material and direct ammonia proton conductive fuel cell applied therewith", Application No. 19/197490 (Filing date : 2025. 05. 02)

11. Kang Taek Lee, Seeun Oh, Hyeonggeun Kim, Mincheol Lee, **Dongyeon Kim**, " Bidirectional proton conducting fuel cell and its method for preparing the same", Application No. 10-2025-0055747 (Filing date : 2025. 04. 28)

10. Kang Taek Lee, **Dongyeon Kim**, Hyeonggeun Kim, Seeun Oh, "Double perovskite air electrode oxide and its method for preparing the same", Application No. 10-2025-0054319 (Filing date : 2025. 04. 25)

9.Kang Taek Lee, Kang Yong Lee, Joongmyeon Bae, Seeun Oh, Hyeonggeun Kim, Mincheol Lee, **Dongyeon Kim**, " High-entropy perovskite-based catalyst material and direct ammonia protonic ceramic fuel cells using the same", Application No. 10-2025-0028845 (Filing date : 2025. 03. 06)

8. Kang Taek Lee, **Dongyeon Kim**, Hyunggeun Kim, Seeun Oh, " Design of High-Entropy Double Perovskite Air Electrode Materials and Development of High-Efficiency Reversible Protonic Ceramic Electrochemical Cells Utilizing the Same", Application No. 10-2025-0024987 (Filing Date: 2025.02.26)

7. Kang Taek Lee, Seeun Oh, **Dongyeon Kim**, "High-entropy electrolyte material, its manufacturing method, and high-performance bidirectional proton conductive fuel cell using it", Application No. PCT/KR2024/096310 (Filing Date: 2024.10.10)

6. Kang Taek Lee, **Dongyeon Kim**, Seeun Oh, Hyunggeun Kim, "A method of manufacturing a bidirectional proton conductive fuel cell using microwave-based sintering and a bidirectional proton conductive fuel cell manufactured therefrom", Application No. PCT/KR2024/015320 (Filing Date: 2024.10.08)

5. Kang Taek Lee, Seeun Oh, **Dongyeon Kim**, "High-entropy electrolyte material, its manufacturing method, and high-performance bidirectional proton conductive fuel cell using it", Application No. 10-2023-0145918 (Filing Date: 2024.08.12)

4. Kang Taek Lee, Seeun Oh, Hyeonggeun Kim, **Dongyeon Kim**, "A method of manufacturing a bidirectional protonic conductive fuel cell using microwave-based sintering and a bidirectional protonic conductive fuel cell manufactured thereby", Application No. 10-2024-0103945 (Filing date : 2024. 08. 05)

3.Kang Taek Lee, Seeun Oh, **Dongyeon Kim**, "Cathode material containing bimetal-doped barium cobaltite-based perovskite and bi-directional proton conductive fuel cell containing the same", Application No. 18/521774 (Filing date : 2023. 11. 28)

2. Woochul Jung, Sejong Ahn, **Dongyeon Kim**, Kang Taek Lee, "Perovskite for Air -Electrode Catalyst and Electrochemical Device having the Same", Application No. 10-2023-0056038 (Filing Date: 2023.04.28)

1. Kang Taek Lee, **Dongyeon Kim**, Seeun Oh, "Cathode material containing bimetal-doped barium cobaltite-based perovskite and bi-directional proton conductive fuel cell containing the same", Application No. 10-2022-0166153 (Filing Date: 2022.12.01)

PRESENTATIONS

23. **D. Kim**, Y. Kang, H. Kim, S. Oh, S. Jang, M. Lee, K. T. Lee*, " Microwave-driven Vapor Diffusion: Advancing Low-Temperature Fabrication for Protonic Ceramic Electrochemical Cells ", **ECerS XIX, (2025).** (Oral Presentation)

22. **D. Kim**, Y. Kang, H. Kim, S. Oh, S. Jang, M. Lee, K. T. Lee*, "Advancing Low-Temperature Sintering Method for Protonic Ceramic Electrochemical Cells", **The Korean Ceramic Society, (2025).** (Oral Presentation)

21. **D. Kim**, H. Kim, H. Yu, S. Oh, M. Lee, K. T. Lee*, " Large-Scale Deposition of Triple-Conducting Oxide Films for High-Performance Protonic Ceramic Electrochemical Cells", **The Korean Ceramic Society, (2025).** (Poster Presentation)

20. **D. Kim**, H. Kim, H. Yu, S. Oh, M. Lee, K. T. Lee*, "Scalable Fabrication of Triple-Conducting Oxide Thin Film for Enhanced Protonic Ceramic Electrochemical Cells", **KCerS-ECerS Joint Symposium, (2024).** (Oral Presentation)

19. **D. Kim**, H. Kim, H. Yu, S. Oh, K. T. Lee*, "Ultrathin Triple Conducting Oxide Interlayer for Protonic Ceramic Electrochemical Cells Fabricated by Chemical Solution Deposition", **PRiME 2024, (2024).** (Oral Presentation)

18. **D. Kim**, J. H. Kim, S. Ahn, W. C. Jung, K. T. Lee*, "Advanced Oxygen Electrodes for Protonic Ceramic Electrochemical Cells: The Role of Ta-Stabilized $BaCoO_{3-\delta}$", **24th International Conference on Solid State Ionics, (2024).** (Oral Presentation)

17. **D. Kim**, I. Jeong, S. Ahn, S. Oh, H. -N. Im, H. Bae, S. -J. Song, C. -W. Lee, W. C. Jung, K. T. Lee*, "Unraveling Hexagonal Symmetry Breaking Effects in $BaCoO_{3-\delta}$ Perovskites as Oxygen Electrodes of Protonic Ceramic Electrochemical Cells", **The Korean Ceramic Society, (2024).** (Poster Presentation)

16. **D. Kim**, I. Jeong, S. Ahn, S. Oh, H. -N. Im, H. Bae, K. T. Lee*, " Advancing Reversible Protonic Ceramic Electrochemical Cells: Bifunctional Oxygen Electrodes with Bimetal-doped $BaCoO_{3-\delta}$ Perovskites ", **The 22nd Korea-Japan Students' Symposium, (2023).** (Oral Presentation)

15. **D. Kim**, K.T. Bae, K. J. Kim, H. -N. Im, S. S. Jang, S. Oh, S. W. Lee, T. H. Shin, K. T. Lee*, "Revolutionizing Protonic Ceramic Electrochemical Cells : Stoichiometric Electrolytes and Nanostructured Fuel Electrode via Microwave Dielectric Heating", **The Korean Electrochemical Society, (2023).** (Oral Presentation)

14. J. H. Kim, **D. Kim**, S. Ahn, K. J. Kim, S. Jeon, D. -K. Lim, J. K. Kim, U. Kim, H. -N. Im, B. Koo, W. C. Jung, K. T. Lee*, "Ta-Stabilized $BaCoO_{3-\delta}$ as a Highly Active Oxygen Electrodes of Reversible Protonic Ceramic Electrochemical Cells", **The Korean Ceramic Society (ACerS Korea Chapter), (2023).** (Oral Presentation)

13. **D. Kim**, I. Jeong, S. Ahn, S. Oh, H. -N. Im, H. Bae, S. -J. Song, C. -W. Lee, W. C. Jung, K. T. Lee*, "Bimetal-doped $BaCoO_{3-\delta}$ Perovskites as Oxygen Electrodes for Reversible Protonic Ceramic Electrochemical Cells", **The Korean Ceramic Society, (2023).** (Oral Presentation)

12. **D. Kim**, K.T. Bae, K. J. Kim, H. -N. Im, S. S. Jang, S. Oh, S. W. Lee, T. H. Shin, K. T. Lee*, "Mitigation of Cation Diffusion and Microstructural Coarsening of Protonic Ceramic Electrochemical Cells via Ultra-fast Fabrication Process", **The 21st Korea-Japan Students' Symposium, (2022).** (Oral Presentation)

11. **D. Kim**, K.T. Bae, K. J. Kim, H. -N. Im, S. S. Jang, S. Oh, S. W. Lee, T. H. Shin, K. T. Lee*, "High-Performance Protonic Ceramic Electrochemical Cells Fabricated by Ultra-fast Microwave-assisted Sintering", **The Korean Ceramic Society, (2022).** (Oral Presentation)

10. **D. Kim**, S. S. Jang, S. Oh, K. T. Lee*, "Bimetal-doped $BaCoO_{3-\delta}$ Materials as Oxygen Electrodes for High-Performance Protonic Ceramic Electrochemical Cells", **242nd The Electrochemical Society, (2022).** (Oral Presentation)

9. **D. Kim**, K.T. Bae, K. J. Kim, H. -N. Im, S. S. Jang, S. Oh, K. T. Lee*, "Ultrafast Fabrication of Protonic Ceramic Electrochemical Cells (PCECs) via Rapid Co-sintering Process", **241st The Electrochemical Society, (2022).** (Oral Presentation)

8. **D. Kim**, K. J. Kim, K. T. Lee*, "Microstructural Optimization for High Performance Protonic Ceramic Electrochemical Cells", **The Korean Ceramic Society, (2022).** (Poster Presentation)

7. **D. Kim**, K. J. Kim, K. T. Lee*, "Ultrafast Fabrication of Protonic Ceramic Fuel Cells (PCFCs) via Rapid and Low Temperature Co-sintering Process", **The Korean Ceramic Society, (2021).** (Poster Presentation)

6. **D. Kim**, K. J. Kim, K. T. Lee*, "Ultrafast Fabrication of Protonic Ceramic Fuel Cells (PCFCs) via Rapid Co-sintering Method", **6th Asian SOFC symposium and Exhibition, (2021).** (Poster Presentation)

5. **D. Kim**, K. R. Yoon*, "Electrospun Nanofiber Based Multi-functional Filter Medium Decorated by Metal-Organic Frameworks and Fe-doped TiO2 Nanorod Composites", **The Korean Fiber, (2020).** (Poster Presentation)

4. **D. Kim**, K. R. Yoon*, "Nanofiber Based Chemical/Physical Filter Platform Using Metal-Organic Framework (MOF) Decorated on Fe-Doped TiO_2 Nanorod Composites", **International Conference on Electronic Materials and Nanotechnology for Green Environment, (2020).** (Poster Presentation)

3. **D. Kim**, K. R. Yoon*, "Nanofiber Based Multifunctional Filter Platform Using Metal-Organic Frameworks (MOFs) Decorated Fe-doped TiO_2 Nanorod Composites", **The Polymer Society of Korea, (2020).** (Oral Presentation)

2. **D. Kim**, Y. Lee, T, Kim, Y. Park, H. M. Jeong, K. Kim*, "MOF/CNT Sandwich-Structured Nanofiber Composites for Supercapacitor Electrodes", **Asia-Pacific Thermofluid Science & Engineering Conference, (2019).** (Poster Presentation)

1. **D. Kim**, Y. Lee, K. Kim*, "Fabrication of Hybrid MOFs/MoS_2 Transistors for Gas Sensing", **The Korean Society of Mechanical Engineers, (2019).** (Poster Presentation)