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조교수, 공학박사

동국대학교 기계로봇에너지공학과

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연구 분야

- 3차원 수치해석 기반 기초 연구
- 다중물리 반응유동 해석 (CFD)
- 고체산화물 셀(SOFC/SOEC) 스택 설계: 분리판, 매니폴드, 적층
- AI-CFD 통합 최적화 (베이지안 최적화, PINN)
- 촉매 표면반응 동역학

학력

연세대학교

기계공학 박사 2021.02
학위논문: *Development of reliable surface reaction mechanism of low-temperature dry reforming of methane on bi-metallic catalyst*
지도교수: 홍종섭 교수

고려대학교

기계공학 석사 2016.02
학위논문: *Internal Pressure Fluctuations in Air-conditioner Indoor Unit with Cross-flow Fan*
지도교수: 문영준 교수

고려대학교

기계공학 학사 2014.02
학위논문: *Revealing hydrodynamic structures of bathtub vortex*
지도교수: 문영준 교수

경력

동국대학교 기계로봇에너지공학과

조교수 2026.09 - 현재

한국기계연구원 무탄소발전연구실

선임연구원 2022.02 - 2026.08
- Development of bipolar plate and stack design of solid oxide fuel cell
- Optimal design of electrochemical reacting/heat and mass transfer

연세대학교 기계공학과

박사후연구원

2021.03 - 2022.02

- Elucidating catalytic surface reaction mechanism
- Reactor optimization with integrated reacting-flow phenomena

연구조교

2017.03 - 2021.02

- Analyzing catalytic surface reaction kinetics
- Elucidating reacting transport coupling phenomena of CO₂ reforming
- Developing newly designed separator and manifold of solid oxide fuel cell stacks

강의조교

2018년 2학기

- Applied Thermodynamics (MEU3610-03)

강의조교

2018년 1학기

- Air Conditioning and Environmental Engineering (MEU4610-01)

강의조교

2017년 2학기

- Creative Mechanical Engineering Design II (MEU3300-04)

강의조교

2017년 1학기

- Air Conditioning and Environmental Engineering (MEU4610-01)

한국과학기술연구원 고온에너지재료연구센터

학생연구원

2016.12 - 2018.05

- Analyzed potentio-dynamic response of solid oxide fuel cells under electrical load change
- Elucidated the heat and mass transport taking place in the fuel electrode of high-temperature solid oxide fuel cells
- Developed newly designed separator and manifold of solid oxide fuel cell stacks

고려대학교 기계공학과

강의조교

2015년 1학기

- Basic Concepts of Heat Transfer (MECH311-02)

수상 및 장학

- 우수논문상, 한국세라믹학회 (2025)
- 우수논문상, 한국수소및신에너지학회 (2025)
- 우수논문상, 한국수소및신에너지학회 (2023)
- 온드림 미래기술 장학생, 현대차정몽구재단 (2019)
- 우수포스터상, IPHE/한국수소및신에너지학회 (2019)
- 우수박사논문 표창, 연세대학교 대학원 (2018)
- 우수논문상, 연세대학교 기계공학부 (2018)
- 우수포스터상, 한국수소및신에너지학회 (2018)
- 우수포스터상, 한국전기화학학회 (2017)
- 연세대학교 대학원 총학생회 장학금 (2017)
- 제11회 조정훈 학술상, KAIST (2015)
- 코리아텍노콤플렉스 장학금 (2014)

- 고려대학교 기계공학과 동문 장학금 (2013)
- 고려대학교 기계공학과 우등생 (2013)
- 노건 장학금 (2012)
- 고려대학교 기계공학과 최우등생 (2012)
- 고려대학교 기계공학과 최우등생 (2011)
- 크리에이티브 챌린저 장학금 (2011)
- 고려대학교 기계공학과 동문 장학금 (2010)
- 홍산 장학금 (2010)

논문

* 교신저자

국제 학술지 (31편)

1. T.Q. Quach, J.Y. Park, D.K. Lee, A.D. Nguyen, T. Bui, Y.S. Kim, **Y.G. Bae***. "Degradation-aware optimization of SOFC operating strategies under off-design balance-of-plant dynamics". *Applied Energy*, 427, 129087 (2027). doi:10.1016/j.apenergy.2026.129087
2. D.K. Lee, S.H. Lee, J.Y. Park, T. Morosuk, **Y.G. Bae**, Y.S. Kim. "Dynamic start-up and operating window analysis of an ammonia-fueled SOFC system with flexible cracking ratio operation". *Applied Energy*, 427, 129107 (2027). doi:10.1016/j.apenergy.2026.129107
3. A.D. Nguyen, J.Y. Park, **Y.G. Bae**, D.K. Lee, Y.S. Kim. "A 20 kW solid oxide electrolysis cell system with hydrogen recirculation: operational performance and thermodynamic evaluation". *Energy Conversion and Management*, 368, 122007 (2026). doi:10.1016/j.enconman.2026.122007
4. S.Y. Kim, B.H. Kang, Y.S. Kim, D.K. Lee, **Y.G. Bae**, J.Y. Park. "Greenhouse cooling demonstration with renewable energy-based tri-generation system". *Case Studies in Thermal Engineering*, 87, 108566 (2026). doi:10.1016/j.csite.2026.108566
5. B.H. Kang, J.S. Kim, D.K. Lee, **Y.G. Bae**, Y.S. Kim, J.Y. Park. "Ammonia-reformate-fueled PEMFC anode recirculation using cathode-degraded PEMFCs as electrochemical hydrogen pumps". *Renewable Energy*, 276, 126360 (2026). doi:10.1016/j.renene.2026.126360
6. D.K. Lee, **Y.G. Bae**, J.Y. Park, S.H. Lee, S.Y. Lee, T. Morosuk, Y.S. Kim. "Experimental study and thermodynamic assessment of a bypass-enabled ammonia-fueled SOFC system". *Case Studies in Thermal Engineering*, 85, 108388 (2026). doi:10.1016/j.csite.2026.108388
7. H.S. Lee, J.W. Baek, **Y.G. Bae***, M.G. Choi*. "Multi-Objective Optimization of Solid Oxide Electrolysis Cell Efficiency and Thermal Gradient using an Active-Learning-CFD Hybrid Framework". *Applied Thermal Engineering*, 303, 132115 (2026). doi:10.1016/j.applthermaleng.2026.132115
8. W.C. Shin, T.Q. Quach, A.D. Nguyen, D.K. Lee, J.Y. Park, Y.S. Kim, S.Y. Lee, **Y.G. Bae***. "Techno-thermodynamic Investigation of Pressurized Ammonia-fueled SOFC Systems for Co-production of Electricity and Hydrogen". *Applied Energy*, 417, 128040 (2026). doi:10.1016/j.apenergy.2026.128040

9. B.H. Kang, Y.S. Kim, Y.G. Bae, D.K. Lee, J.Y. Park*. "Experimental validation of a fuel cell-based tri-generation system with active heat recovery for greenhouse: Heating". *Case Studies in Thermal Engineering*, 82, 108119 (2026). doi:10.1016/j.csite.2026.108119
10. A.D. Nguyen, T.Q. Quach, W.C. Shin, D.K. Lee, J.Y. Park, Y.S. Kim, S.Y. Lee, Y.G. Bae*. "Design and optimization of pressurized ammonia solid oxide fuel cell systems with anode recirculation for co-production of hydrogen and electricity". *Energy Conversion and Management: X*, 30, 101873 (2026). doi:10.1016/j.ecmx.2026.101873
11. T.Q. Quach, D.K. Lee, Y.S. Kim, Y.G. Bae, S.Y. Lee, Y. Kim, J.Y. Park*. "Degradation-considered techno-economic analysis of ammonia solid oxide fuel cell recirculation system using electrochemical hydrogen compressor". *Journal of Power Sources*, 664, 238919 (2026). doi:10.1016/j.jpowsour.2025.238919
12. T.Q. Quach, D.K. Lee, J.Y. Park, Y.S. Kim, S.H. Lee, H.J. Jang, S.Y. Lee, Y.G. Bae*. "Comprehensive analysis of a full-scale solid oxide fuel cell stack fueled by ammonia". *Energy Conversion and Management*, 348, 120618 (2026). doi:10.1016/j.enconman.2025.120618
13. Y.J. Yoon, Y.S. Choi, Y.G. Bae, J. Hong*, K.H. Kim*. "Ni-based alloy catalysts for cost-effective hydrogen production from ammonia decomposition". *Applied Surface Science Advances*, 27, 100759 (2025). doi:10.1016/j.apsadv.2025.100759
14. T. Bui, B.H. Kang, Y.S. Kim, Y.G. Bae, D.K. Lee, S.M. Lee, J.Y. Park*. "Fuel cell based tri-generation system for horticulture - part 1. Heating". *Energy*, 332, 137186 (2025). doi:10.1016/j.energy.2025.137186
15. W. Lee, Y.G. Bae, S. Lee, J. Hong*. "Elucidating the dynamic transport phenomena of solid oxide fuel cells according to rapid electrical load change operation". *Applied Energy*, 359, 122678 (2024). doi:10.1016/j.apenergy.2024.122678
16. D.K. Lee, Y.S. Kim*, Y.G. Bae, J.Y. Park, K.Y. Ahn. "Dynamic behavior of an SOEC system with a schedule-based start-up and operating process". *Journal of Energy Resources Technology*, 146(7), 072102 (2024). doi:10.1115/1.4065210
17. K.P. Hong, M.G. Choi, Y.G. Bae, J.H. Min, J.Y. Lee, D.W. Kim, S.H. Bang, H.K. Lee, W.Y. Lee*, J. Hong*. "Direct methane protonic ceramic fuel cells with self-assembled Ni-Rh bimetallic catalyst". *Nature Communications*, 14, 7485 (2023). doi:10.1038/s41467-023-43388-8
18. T.Q. Quach, Y.S. Kim, D.K. Lee, K.Y. Ahn, S.Y. Lee, Y.G. Bae*. "Thermal management of Ammonia-fed Solid oxide fuel cells using a novel alternate flow interconnector". *Energy Conversion and Management*, 291, 117248 (2023). doi:10.1016/j.enconman.2023.117248
19. K. Hong, J. Min, G. Min, Y.G. Bae, J. Hong*. "Carbon-neutral conversion of methane supported by Ni-(Rh, Co) bimetallic catalysts for low-temperature proton-conducting ceramic fuel cells". *Chemical Engineering Journal*, 462, 142334 (2023). doi:10.1016/j.cej.2023.142334
20. D.K. Lee, T.Q. Quach, T.P. Israel, K.Y. Ahn, Y.G. Bae, Y.S. Kim*. "Analysis of start-up behavior based on the dynamic simulation of an SOFC-engine hybrid system". *Energy Conversion and Management*, 272, 116384 (2022). doi:10.1016/j.enconman.2022.116384
21. Y.G. Bae, J. Hong*. "Enhancement of surface morphology and catalytic kinetics of NiAl₂O₄ spinel-derived Ni catalyst to promote dry reforming of methane at low temperature for the

- direct application to a solid oxide fuel cell". *Chemical Engineering Journal*, 446, 136978 (2022). doi:10.1016/j.cej.2022.136978
22. J. Lee, Y.G. Bae, K. Hong, J. Hong*. "Comparative evaluation of Ni-based bimetallic catalysts for dry reforming of methane at low temperature: the effect of alloy itself on performance". *International Journal of Energy Research*, 46(8), 11228-11249 (2022). doi:10.1002/er.7923
 23. D.H. Kim, Y.G. Bae, S.H. Lee, J.W. Son, J.H. Shim, J. Hong*. "Thermal analysis of a 1-kW hydrogen-fueled solid oxide fuel cell stack by three-dimensional numerical simulation". *Energy Conversion and Management*, 222, 113213 (2020). doi:10.1016/j.enconman.2020.113213
 24. Y.G. Bae, S.H. Lee, J. Hong*. "The effect of anode microstructure and fuel utilization on current relaxation and concentration polarization of solid oxide fuel cell under electrical load change". *Energy Conversion and Management*, 201, 112152 (2019). doi:10.1016/j.enconman.2019.112152
 25. J.Y. Kim, D.H. Kim, W.S. Lee, S.H. Lee, Y.G. Bae, J. Hong*. "Thermo-fluid analysis of a planar solid oxide fuel cell with an improved flow field by manifold and flow channel design". *ECS Transactions*, 91(1), 255-262 (2019). doi:10.1149/09101.0255ecst
 26. H.Y. Jeong, S.W. Kim, Y.G. Bae, K.J. Yoon, J.H. Lee, J. Hong*. "Effect of Fe infiltration to Ni/YSZ solid-oxide-cell fuel-electrode on steam/CO₂ co-electrolysis". *International Journal of Energy Research*, 43, 4949-4958 (2019). doi:10.1002/er.4577
 27. H. Han, Y.G. Bae, S.T. Hwang, H.Y. Kim, I. Park, S.M. Kim, Y.H. Choe, Y.J. Moon*, J.H. Choi*. "Computationally simulated fractional flow reserve from coronary computed tomography angiography based on fractional myocardial mass". *International Journal of Cardiovascular Imaging*, 35, 185-193 (2019). doi:10.1007/s10554-018-1432-z
 28. S.H. Lee, Y.G. Bae, K.J. Yoon, J.H. Lee, W.J. Choi, J. Hong*. "Key characteristics of a hydrocarbon-fueled solid oxide fuel cell examined by local thermodynamic states". *Energy Conversion and Management*, 174, 565-578 (2018). doi:10.1016/j.enconman.2018.08.064
 29. Y.G. Bae, S.H. Lee, K.J. Yoon, J.H. Lee, J. Hong*. "Three-dimensional dynamic modeling and transport analysis of solid oxide fuel cells under electrical load change". *Energy Conversion and Management*, 165, 405-418 (2018). doi:10.1016/j.enconman.2018.03.064
 30. S.W. Kim, Y.G. Bae, K.J. Yoon, J.H. Lee, J. Hong*. "High-temperature electrolysis of CO₂-enriched mixtures by using fuel-electrode supported La_{0.6}Sr_{0.4}CoO₃/YSZ/Ni-YSZ solid oxide cells". *Journal of Power Sources*, 378, 369-374 (2018). doi:10.1016/j.jpowsour.2017.12.060
 31. Y.G. Bae, S.T. Hwang, H. Han, S.M. Kim, H.Y. Kim, I. Park, J.M. Lee, J.H. Choi, Y.J. Moon*. "Non-invasive coronary physiology based on computational analysis of intracoronary transluminal attenuation gradient". *Scientific Reports*, 8(1), 4692 (2018). doi:10.1038/s41598-018-23134-7

국내 학술지 (15편)

1. D.K. Lee, T.Q. Quach, A.D. Nguyen, J.Y. Park, Y.G. Bae, Y.S. Kim*. "Integrating LLM and Multioutput Logistic Regression for HAZOP Prediction". *Trans. of the Korean Hydrogen and New Energy Society*, 36(6), 714-723 (2025). doi:10.7316/jhne.2025.36.6.714

2. W.C. Shin, D.K. Lee, J.Y. Park, Y.S. Kim, S.Y. Lee, Y.G. Bae*. "Operation Strategy of Pressurized Solid Oxide Fuel Cell System Fueled by Ammonia". *Trans. of the Korean Hydrogen and New Energy Society*, 36(5), 535-541 (2025). doi:10.7316/jhne.2025.36.5.535
3. T. Bui, J.Y. Park*, D.K. Lee, Y.G. Bae, Y.S. Kim, S.M. Lee. "Fuel Cell-based Tri-generation System Operating Strategy for Horticulture". *Trans. of the Korean Hydrogen and New Energy Society*, 35(6) (2024). doi:10.7316/jhne.2024.35.6.690
4. K.Y. Lee, D.H. Chung, Y.G. Bae, J.M. Bae*. "Catalyst Infiltration on Anode of SOFC for Direct Utilization of Ammonia". *Trans. of the Korean Hydrogen and New Energy Society*, 35(6), 667-672 (2024). doi:10.7316/jhne.2024.35.6.667
5. Y.G. Bae*, T.Q. Quach, D.K. Lee, J.Y. Park, Y.S. Kim, S.Y. Lee. "Development of NH₃-Fed Solid Oxide Fuel Cell Stack by KIMM". *Trans. of the Korean Society of Mechanical Engineers B*, 48(12) (2024). doi:10.3795/ksme-b.2024.48.12.817
6. J.Y. Park*, T.Q. Quach, J.S. Kim, Y.G. Bae, D.K. Lee, Y.S. Kim, S.Y. Lee, Y. Kim. "Ammonia-fueled Solid Oxide Fuel Cell Recirculation Systems for Power Generation". *Trans. of the Korean Hydrogen and New Energy Society*, 35(1), 40-47 (2024). doi:10.7316/jhne.2024.35.1.40
7. J.Y. Park*, T. Bui, S.Y. Park, D.K. Lee, Y.G. Bae, Y.S. Kim, S.M. Lee. "Fuel Cell-based Cogeneration System for Greenhouse Cooling and Heating". *Trans. of the Korean Hydrogen and New Energy Society*, 34(6), 667-672 (2023). doi:10.7316/jhne.2023.34.6.667
8. T.Q. Quach, Y.G. Bae, K.Y. Ahn, S.Y. Lee, Y.S. Kim*. "Exergetic Analysis of Ammonia-fueled Solid Oxide Fuel Cell Systems for Power Generation". *Journal of the Korean Institute of Gas*, 27(3), 27 (2023).
9. T.H. Kim, D.Y. Kim, D.K. Lee, Y.S. Kim, K.Y. Ahn, Y.G. Bae, J.Y. Park, Y. Kim. "Study on thermodynamic performance of electrochemical hydrogen compressor". *Trans. of the Korean Hydrogen and New Energy Society*, 34(2), 141-148 (2023). doi:10.7316/jhne.2023.34.2.141
10. D.Y. Kim, T.H. Kim, D.K. Lee, Y.S. Kim, K.Y. Ahn, Y.G. Bae, J.Y. Park, Y. Kim. "Study on Electrochemical Hydrogen Separation of Hydrogen and Nitrogen Mixture Gas". *Trans. of the Korean Hydrogen and New Energy Society*, 34(2), 149-154 (2023). doi:10.7316/jhne.2023.34.2.149
11. D.K. Lee, T.P. Israel, Y.G. Bae, Y.S. Kim*, K.Y. Ahn, S.Y. Lee. "Analysis of levelized cost of electricity for type of stationary fuel cells". *Trans. of the Korean Hydrogen and New Energy Society*, 33(6), 643-659 (2022). doi:10.7316/khnes.2022.33.6.643
12. V.T. Giap, T.Q. Quach, K.Y. Ahn, Y.G. Bae, S.Y. Lee, Y.S. Kim*. "1D kinetics model of NH₃-fed solid oxide fuel cell". *Trans. of the Korean Hydrogen and New Energy Society*, 33(6), 723-732 (2022). doi:10.7316/khnes.2022.33.6.723
13. T.Q. Quach, V.T. Giap, D.K. Lee, S.Y. Lee, Y.G. Bae, K.Y. Ahn, Y.S. Kim*. "Performance analysis of ammonia-fed solid oxide fuel cell using alternating flow". *Trans. of the Korean Hydrogen and New Energy Society*, 33(5), 557-565 (2022). doi:10.7316/khnes.2022.33.5.557
14. T. Bui, Y.S. Kim*, D.K. Lee, K.Y. Ahn, Y.G. Bae, S.M. Lee. "Economic Analysis and Comparison between Low-Power and High-Power SOEC Systems". *Trans. of the Korean Hydrogen and New Energy Society*, 33(6), 707-714 (2022). doi:10.7316/khnes.2022.33.6.707

15. **Y.G. Bae**, D.H. Kim, S.T. Hwang, Y.J. Moon*. "Three-dimensional flow computation and performance characteristics analysis of propellers for water treatment mixer". *Journal of Computational Fluids Engineering*, 20(1), 10-15 (2015). doi:10.6112/kscfe.2015.20.1.010

학술대회 발표

국제 학술대회 (9건)

1. **Y.G. Bae***, K.Y. Ahn, Y.S. Kim, J.Y. Park, D.K. Lee. "Thermochemical Variable Analysis of Solid Oxide Fuel Cell with 3D Multi-physical Simulation". *ECOS 2023*, Las Palmas de Gran Canaria, Spain (2023). (oral)
2. T.Q. Quach, D.K. Lee, T. Bui, Y.S. Kim, **Y.G. Bae***, K.Y. Ahn. "Nitrogen/Hydrogen as thermochemical energy storage material in NH₃ fed reversible solid oxide fuel cell system for electrical energy storage". *ECOS 2022*, Copenhagen, Denmark (2022). (oral)
3. **Y.G. Bae**, J. Hong*. "Reaction kinetics of catalytic dry reforming of methane on spinel-derived nickel catalyst at low-temperature using an in-situ stagnation-flow reactor". *PRiME 2020*, Online (2020). (poster)
4. **Y.G. Bae**, J. Hong*. "Surface reaction kinetics of dry reforming of methane on Ni/Al₂O₃ catalyst at low-temperature using an in-situ stagnation-flow reactor". *PACRIM13*, Okinawa, Japan (2019). (poster)
5. **Y.G. Bae**, J. Hong*. "Investigation of surface reaction kinetics of dry reforming of methane on Ni/Al₂O₃ catalyst at low temperature using an in-situ stagnation flow reactor". *32nd IPHE Outreach Event*, Seoul, Korea (2019). (poster)
6. **Y.G. Bae**, J. Hong*. "Characteristics of surface reaction kinetics of methane assisted by CO₂ on Ni/Al₂O₃ catalyst at low temperature using an in-situ stagnation flow reactor". *MODEGAT VI*, Bad Herrenalb, Germany (2019). (poster)
7. **Y.G. Bae**, J. Hong*. "Reaction mechanism analysis of dry reforming of methane on Ni/Al₂O₃ catalyst at low temperature using an in-situ stagnation flow reactor". *ICOSCAR6*, Bad Herrenalb, Germany (2019). (poster)
8. **Y.G. Bae**, J. Hong*. "Reaction kinetics of catalytic dry reforming of methane on Ni/Al₂O₃ at low-temperature using a stagnation-flow reactor". *SSI-22 (2019)*, Pyeongchang, Korea (2019). (poster)
9. **Y.G. Bae**, S.H. Lee, K.J. Yoon, J.H. Lee, J. Hong*. "Dynamic response of solid oxide fuel cell: The effect of anode microstructure on transport phenomena under electrical load change". *MCARE 2018*, Vancouver, British Columbia, Canada (2018). (invited oral)

국내 학술대회 (14건)

1. **Y.G. Bae***, Y.S. Kim, J.Y. Park, D.K. Lee, S.Y. Lee. "Development of NH₃-fed solid oxide fuel cell stack by KIMM". *2024 KSME Fall Meeting*, Jeju, Korea (2024). (oral)
2. **Y.G. Bae***, T.Q. Quach, D.K. Lee, J.Y. Park, Y.S. Kim, S.Y. Lee. "Thermal management of NH₃-fed SOFC using a novel alternative flow interconnector". *2024 KECS Spring Meeting*, Busan, Korea (2024). (invited talk)

3. **Y.G. Bae***, K.Y. Ahn, Y.S. Kim, J.Y. Park, D.K. Lee. "Development of NH₃-fed solid oxide fuel cell stack by KIMM". **2023 KHNES Fall Meeting**, Jeju, Korea (2023). (oral)
4. T.Q. Quach, Y.S. Kim, D.K. Lee, K.Y. Ahn, S.Y. Lee, **Y.G. Bae***. "Thermal management of NH₃-fed solid oxide fuel cell by using a novel alternate flow interconnector". **2023 KSME Spring Meeting**, Busan, Korea (2023). (oral)
5. **Y.G. Bae***, K.Y. Ahn, Y.S. Kim, J.Y. Park, D.K. Lee. "Thermochemical variable analysis of solid oxide fuel cell with 3D multi-physical simulation". **2022 KHNES Fall Meeting**, Jeju, Korea (2022). (oral)
6. **Y.G. Bae**, J. Hong*. "Development of reaction kinetics for catalytic dry reforming of methane on Ni/Al₂O₃ at low-temperature using an in-situ stagnation-flow reactor". **2019 KSME Spring Meeting**, Busan, Korea (2019). (oral)
7. **Y.G. Bae**, J. Hong*. "Dynamic response of solid oxide fuel cell: The effect of transport phenomena on polarization losses under electrical load change". **2019 KSS Symposium**, Busan, Korea (2019). (young scientist session, oral)
8. **Y.G. Bae**, J. Hong*. "Reaction mechanism study of low temperature catalytic dry reforming of methane on Rh/Al₂O₃ catalysts using a stagnation-flow reactor". **2018 KSME Fall Meeting**, Jeongseon, Korea (2018). (oral)
9. **Y.G. Bae**, J. Hong*. "Reaction kinetics of low temperature catalytic dry reforming of methane on Rh/Al₂O₃ catalysts using stagnation-flow reactor". **2018 KCerS Fall Meeting**, Seoul, Korea (2018). (poster)
10. **Y.G. Bae**, S.H. Lee, K.J. Yoon, J.H. Lee, J. Hong*. "Dynamic response of solid oxide fuel cell: The effect of anode microstructure and operating conditions on transport phenomena under electrical load change". **2018 KHNES Fall Meeting**, Changwon, Korea (2018). (poster)
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13. **Y.G. Bae**, S.H. Lee, K.J. Yoon, J.W. Son, J.H. Lee, B.K. Kim, H.W. Lee, J. Hong*. "3D dynamic modeling and thermomechanical analysis of solid oxide fuel cells under load change". **2017 KECS Spring Meeting**, Jeju, Korea (2017). (poster)
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2. K.Y. Ahn, Y.S. Kim, **Y.G. Bae**, D.K. Lee, T.P. Israel. "연료전지용 관형 매니폴드 및 이를 포함하는 연료전지 시스템". **KR 10-2872695** (2025)
3. K.Y. Ahn, Y.S. Kim, **Y.G. Bae**, D.K. Lee. "수소 제조 압축 장치, 및 이를 이용한 수소 제조 압축 방법". **KR 10-2810525** (2025)
4. J.S. Hong, **Y.G. Bae**, S.H. Lee, D.H. Kim, K.J. Yoon, J.H. Lee. "Fuel cell with improved thermal distribution in stack". **US 11050066** (2021)
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7. J.S. Hong, **Y.G. Bae**, S.H. Lee, D.H. Kim, K.J. Yoon, J.H. Lee. "Separator for fuel cell including guide pattern and fuel cell stack including the same". **JP 6804068** (2020)
8. J.S. Hong, **Y.G. Bae**, S.H. Lee, D.H. Kim, K.J. Yoon, J.H. Lee. "A separator for a fuel cell and a fuel cell stack comprising the same". **US 10840533** (2020)
9. J.S. Hong, **Y.G. Bae**, S.H. Lee, D.H. Kim, K.J. Yoon, J.H. Lee. "A fuel cell with improving thermal distribution inside stack". **KR 10-2140468** (2020)
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12. Y.J. Moon, D.H. Kim, **Y.G. Bae**, S.T. Hwang. "Contra rotating propeller unit for mixing fluids". **KR 10-1645982** (2016)

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2. J.Y. Park, Y.S. Kim, **Y.G. Bae**, D.K. Lee, B.H. Kang, S.Y. Kim, H.R. Park. "히트펌프를 포함하는 냉난방 시스템". **KR 10-2025-0176135** (2025)
3. Y.S. Kim, **Y.G. Bae**, J.Y. Park, D.K. Lee, S.Y. Lee. "이종의 연료전지 스택이 직렬로 연결된 연료전지 장치". **KR 10-2025-0162028** (2025)
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5. Y.S. Kim, **Y.G. Bae**, J.Y. Park, D.K. Lee, Y.K. Kim. "고체산화물 전지 시스템". **KR 10-2025-0151776** (2025)
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8. J. Young, J.C. Kim, Y. Kim, D.K. Lee, J.Y. Park, Y.G. Bae, Y.S. Kim, S.Y. Kim, J.E. Chae, J.S. Choi. "히트펌프". **KR 10-2024-0080224** (2024)
9. Y.S. Kim, B.V.T. Ahn, J.Y. Park, D.K. Lee, Y.G. Bae, K.Y. Ahn. "캐스케이드 방식의 고체산화물 수전해셀 시스템". **KR 10-2024-0016132** (2024)
10. J.Y. Park, D.K. Lee, Y.G. Bae, Y.S. Kim, K.Y. Ahn. "전기화학 수소펌프를 이용한 고체산화물 연료전지 재순환 시스템". **KR 10-2023-0171625** (2023)
11. D.K. Lee, K.Y. Ahn, Y.S. Kim, Y.G. Bae, J.Y. Park, Y. Kim. "다단형 전기화학적 수소 압축기 및 그 제어 방법". **KR 10-2023-0120727** (2023)
12. J.Y. Park, K.Y. Ahn, Y.S. Kim, Y.G. Bae, D.K. Lee, S.M. Lee. "온실 냉난방 시스템". **KR 10-2023-0111549** (2023)
13. D.K. Lee, K.Y. Ahn, Y.S. Kim, Y.G. Bae, J.Y. Park. "열효율이 향상된 흡착식 히트펌프, 및 흡착식 히트펌프를 이용한 냉난방 방법". **KR 10-2023-0064635** (2023)
14. D.K. Lee, K.Y. Ahn, Y.S. Kim, Y.G. Bae, J.Y. Park. "완충 다공판을 갖는 수소 압축 장치". **KR 10-2023-0063408** (2023)
15. Y.G. Bae, K.Y. Ahn, Y.S. Kim, J.Y. Park, D.K. Lee, T.Q. Quach. "전해질 지지형 연료 전지". **KR 10-2022-0186322** (2022)

국제출원 (PCT) (2건)

1. J.Y. Park, D.K. Lee, Y.G. Bae, Y.S. Kim, K.Y. Ahn. "고체산화물 연료전지 재순환 시스템". **PCT/KR2024/017683** (2024)
2. D.K. Lee, K.Y. Ahn, Y.S. Kim, Y.G. Bae, J.Y. Park, Y. Kim. "다단형 전기화학적 수소 압축기 및 그 제어 방법". **PCT/KR2024/013797** (2024)

기술이전

1. "신재생에너지 기반 3중 열병합시스템 운용 기술". 기술실시: (주)정보엔지니어링 (2025). 대상: Patent application KR 10-2025-0176135 (Heating and cooling system including heat pump).
2. "전기화학 에너지시스템 소프트웨어 모듈 패키지 프로그램 기술". 기술실시: (주)유아이티 (2024). 대상: Membrane humidifier performance calculation program; Pressure swing adsorber performance calculation program; Solid oxide electrolysis stack performance calculation program; Polymer electrolyte membrane electrolysis stack performance calculation program.
3. "고체산화물 연료전지 성능 계산 프로그램 기술". 기술실시: (주)유아이티 (2023). 대상: Software registration C-2021-046617 (2021.11.11).
4. "열분포가 개선된 SOFC 분리판 및 스택 설계 기술". 기술실시: PNP에너지텍 (2019). 대상: KR 10-2018-0036939; KR 10-2017486; KR 10-2018-0169046.

연구과제

연구책임

1. "수소 생산 비용 저감 및 고순도 산소 자원화 전략을 위한 양극/음극 동시 수증기 공급형 고효율 SOEC 스택 개발"

산업통상자원부 에너지국제공동연구

연구책임자 (주관기관: 한국기계연구원) | 2025.07 - 2026.08

2. **“SOEC 스택극 열화를 억제할 수 있는 분리판 유로 최적 설계”**

한국연구재단 H2GATHER 사업: 고체산화물 수전해전지의 내구성 향상을 위한 글로벌 협력 연구 체계 구축

공동연구개발기관 연구책임자 (한국기계연구원) | 2025.04 - 2026.08

3. **“SOFC 시스템의 암모니아 연료 전환을 위한 시동 기술 및 AI 기반 건전성 기술 개발”**

한국기계연구원 ACE 사업 (참여기업: 에이치앤파워(주))

연구책임자 | 2026.01 - 2026.08

4. **“다중물리현상의 종합적 해석을 위한 수전해용 전산해석 모델 개발”**

포스코홀딩스 연구용역

연구책임자 | 2023.01 - 2023.12

참여: 국가연구과제

1. “Development of planar cells, 20kW class stack modules and systems for large-scale, high-efficiency SOEC”, **지원: Ministry of Trade, Industry and Energy** (2021-2025)

2. “Development of horticultural energy model based on hydrogen fuel cell tri-generation system”, **지원: Rural Development Administration** (2021-2025)

3. “Development of manufacturing technology for improving high temperature durability and efficiency of metal bipolar for SOFC”, **지원: Ministry of Trade, Industry and Energy** (2020-2022)

4. “Chemisorption heat pump system using electrochemical compressor”, **지원: Ministry of Trade, Industry and Energy** (2019-2025)

5. “The development of high-efficiency modular SOFC system with extensible power generation”, **지원: Korea Evaluation Institute of Industrial Technology** (2019-2022)

6. “Reaction mechanism development of high performance/high selectivity/high durability heterogeneous bi-metallic catalyst for carbon-neutral dry reforming of methane”, **지원: National Research Foundation of Korea** (2019-2021)

7. “Long-term stable protonic ceramic fuel cells with large-scale nano-multi-layer structures implementing over 1 W/cm² at 300-500 degC”, **지원: Korea Institute of Energy Technology Evaluation and Planning** (2017-2020)

8. “Development of core-technology for sustainable energy conversion systems facilitating oxy-fuel conversion and CO₂ utilization”, **지원: National Research Foundation of Korea** (2018-2019)

9. “Smart design of SOFC repeating units for thermal-electrical load following by integrative multiphysics analysis”, **지원: Ministry of Science, ICT and Future Planning** (2017-2022)

참여: 산업체 과제

1. “Technology development to reduce fine dust and black carbon emission for ships”, **지원: Korea Shipbuilding & Offshore Engineering Co., Ltd.** (2020-2021)

대외 활동

- 서울특별시 신재생에너지 전문가 자문위원 (2025.05 - 2027.05)
- 한국에너지기술평가원 2026년 수소분야 신규과제 기획자문단 위원 (생산 분야) (2025.10)
- 한국에너지기술평가원 2025년 에너지기술개발사업 연료전지분야 신규과제 기획자문단 위원 (암모니아 SOFC) (2024.11)

강의 가능 과목

- MATLAB/Python for Mechanical Engineers, Special Topics in Design, Computational Fluid Dynamics (CFD)