Chan Kim

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Chemical engineer at Seoul National University × KIST working across four axes — catalysis, reactor systems, code, and economics. I make hydrogen practical: chemical hydride systems, liquid organic carriers, and photothermal ammonia decomposition — and I build the software that runs the research, from literature pipelines to instrument automation. Completing my PhD and open to industry R&D roles in hydrogen, catalysis, and energy systems.

RESEARCH HIGHLIGHTS

Photothermal NH_3 decomposition `ongoing PhD research`
Designing and building the reactor system for plasmon-enhanced photothermal ammonia decomposition, from catalyst to control electronics — the case where the tools and the research are the same story.

Sodium borohydride platform `first author — Chem. Eng. J. 2025`
A five-study arc on acid-mediated $NaBH_4$ hydrolysis along two parallel tracks: on-board hydrogen generation — publicly demonstrated at ADEX 2025 — and a 500-bar, compressor-free charging system.

CO purification for fuel-cell-grade hydrogen `patent application (filed)`
Lead inventor — developed the low-temperature CO purification catalyst and its preparation method, and led reaction-system design and performance evaluation.

Formic acid / formate dehydrogenation `co-first author — ACS Sus. Chem. Eng. 2022`
Operando pH tracking inside the reactor located the acid–formate ratio that maximizes H_2 output.

LOHC & hydrogen economics `first prize — national idea contest`
Techno-economic assessment of hydrogen refueling and compression, with levelized-cost models built from scratch; comparison of competing system designs.

EDUCATION

`2024.03 - present` **PhD Candidate, Chemical & Biological Engineering** — Seoul National University (Advisor: Prof. Jungwon Park) × KIST (Advisor: Dr. Yongmin Kim)
Joint industry–university program
Research focus: Plasmon-enhanced photothermal ammonia decomposition

`2021.03 - 2023.02` **M.S., Master of Science** — Kyung Hee University, Seoul, South Korea
Major: KHU-KIST Convergence Science & Technology (joint industry–university program)

`2015.03 - 2021.02` **B.S., Bachelor of Science** — Kyung Hee University, Seoul, South Korea
Major: Chemistry

PROFESSIONAL EXPERIENCE

`2024.03 - present` **PhD Candidate** — Seoul National University · Hydrogen & Fuel Cell Research Center, KIST, South Korea

`2023.03 - 2024.02` **Post-Master's Researcher/Intern** — Hydrogen & Fuel Cell Research Center, KIST, South Korea

`2021.03 - 2023.02` **Student Researcher** — Hydrogen & Fuel Cell Research Center, KIST, South Korea

PUBLICATIONS

12 published (1 first-author · 2 co-first-author · 9 co-author)

Papers — First Author (1)

1 **High-Pressure, Grid-Independent Hydrogen Generation via Chemical Hydride Hydrolysis: Demonstration and Deployment Strategies** `First author`
Chan Kim, Jaewon Kirk, Felicia Alvita Theda, Euirim On, Keunsoo Kim, Hyuntae Sohn, Suk Woo Nam, Ji Hui Seo, Han Jin Kim, Pyung Soon Kim, Jaeyong Lee, Jihoon Jang, Hyangsoo Jeong*, Yongmin Kim*
Chemical Engineering Journal, 2025 · doi:10.1016/j.cej.2025.162983
First author — led the project from planning through demonstration

Papers — Co-First Author (2)

2 **Selective CO-to-hydrocarbon conversion in formic acid–promoted borohydride hydrolysis for PEMFC-grade hydrogen production** `Co-first author`

Inseok Lee§, **Chan Kim**§, Hyun Sung Lim, Felicia Alvita Theda, Keunsoo Kim, Minseok Bae, Hyuntae Sohn, Pyung Soon Kim, Jaeyong Lee, Hyangsoo Jeong*, Yongmin Kim*

International Journal of Hydrogen Energy, 2026 · doi:10.1016/j.ijhydene.2026.157136

Contribution — PFR-based CO purification experiments coupled with heat-flow simulation

3 **Strategy for Efficient H_2 Production from a Mixture of Formic Acid and Formate using Operando pH Measurements** `Co-first author`

Chan Kim§, Kimoon Lee§, Il-Han Yoo, Yu-Jin Lee, Safira Ramadhani, Hyuntae Sohn, Suk Woo Nam, Joohoon Kim, Yongmin Kim*, Hyangsoo Jeong*

ACS Sustainable Chemistry & Engineering, 2022 · doi:10.1021/acssuschemeng.1c06603

Contribution — Conceptualization, experiments, catalyst characterization, reaction product analysis, manuscript writing

Papers — Co-Author (9)

4 **Dependence of catalytic properties of strongly supported platinum clusters with atom counts**

Chyan Kyung Song, Junhyeok Jung, Shyama Charan Mandal, Sungsu Kang, Tae Yong Kim, **Chan Kim**, Gyeongrok Jang, Hyungjoo Kim, Younhwa Kim, Kyung Rok Lee, Ji Soo Kim, Junjie Chen, Yongmin Kim, Chang Won Yoon, Thomas F. Jaramillo, Matteo Cargnello, Frank Abild-Pedersen, Jungwon Park

Science, 2026 · doi:10.1126/science.aeb3087

Contribution — In-situ DRIFTS analysis

5 **Efficient aqueous activation of boron nitride colloidal catalysts for enhanced selective methane oxidation under mild conditions**

Younhwa Kim, Hobin Kwak, Chanhee Choi, Hyesung Choi, Sungsu Kang, **Chan Kim**, Yongmin Kim, Jungwon Park

Chemical Engineering Journal, 2025 · doi:10.1016/j.cej.2025.165419

Contribution — In-situ DRIFTS analysis

6 **Reduction-Induced Oxygen Loss: the Hidden Surface Reconstruction Mechanism of Layered Oxide Cathodes in Lithium-Ion Batteries**

Seungyun Jeon, Gukhyun Lim, Hoseok Lee, Hyunyoung Park, Min Kyung Cho, **Chan Kim**, YeEun Lee, Jaehoon Kim, Minhyung Kwon, Jung-Keun Yoo, Hyangsoo Jeong, Jinwoo Kim, Seung-Ho Yu, Minah Lee, Jongsoon Kim, Jihyun Hong

Advanced Energy Materials, 2025 · doi:10.1002/aenm.202404193

Contribution — Reaction product analysis — gas chromatography (GC)

7 **Promoter-guided reaction intermediate dynamics enhance perhydro-benzyltoluene dehydrogenation**

Euirim On§, Kimoon Lee§, Yeonsu Kwak, **Chan Kim**, Quan Nguyen Dao, Hyuntae Sohn, Suk Woo Nam, Joohoon Kim, Yongmin Kim*, Hyangsoo Jeong*

ACS Catalysis, 2025 · doi:10.1021/acscatal.4c07703

Contribution — Experimental design for mechanism-verification studies and XPS support

8 **Novel Roles of Catalysts in Producing High-Purity High-Pressure Hydrogen from Sodium Borohydride**

Felicia Alvita Theda§, Kimoon Lee§, **Chan Kim**, Yu-Jin Lee, Keunsoo Kim, Hyuntae Sohn, Suk Woo Nam, Yongmin Kim, Hyangsoo Jeong*

ChemSusChem, 2024 · doi:10.1002/cssc.202401694

Contribution — Experimental apparatus design & construction, reaction-mechanism experiment design

9 **Pore Surface Engineering of Al_2O_3-supported Ru Catalysts with TiO_2 for Enhanced Selective CO Methanation**

Yu-Jin Lee§, Kiwon Kang§, **Chan Kim**, Jaewon Kirk, Hyuntae Sohn, Suk Woo Nam, Joohoon Kim, Hyangsoo Jeong*, Yongmin Kim*

Applied Surface Science, 2024 · doi:10.1016/j.apsusc.2024.159551

Contribution — Experiments, catalyst characterization, reaction product analysis

10 **Synergistic structural and electronic influences of Pt bead catalysts on dehydrogenation activity for liquid organic hydrogen carriers**

Seungmok Han§, Chang-il Ahn§, Byeong Jo Shim, Euirim On, **Chan Kim**, Hyuntae Sohn, Hyangsoo Jeong, Yongmin Kim*, Chang Won Yoon*

Chemical Engineering Journal, 2024 · doi:10.1016/j.cej.2024.150446

Contribution — X-ray photoelectron spectroscopy (XPS) analysis

11 **Sequential reactions toward a high-pressure H_2 generation from a mixture of sodium borohydride and formic acid**

Safira Ramadhani, **Chan Kim**, Jaewon Kirk, Hyuntae Sohn, Suk Woo Nam, Yongmin Kim, Kwang Ho Song*, Hyangsoo Jeong*

Cell Reports Physical Science, 2024 · doi:10.1016/j.xcrp.2023.101759

Contribution — Conceptualization, techno-economic assessment

12 **Regulating Dynamic Electrochemical Interface of $LiNi_{0.5}Mn_{1.5}O_4$ Spinel Cathode for Realizing Simultaneous Mn and Ni Redox in Rechargeable Lithium Batteries**

Gukhyun Lim, Dongki Shin, Keun Hwa Chae, Min Kyung Cho, **Chan Kim**, Seok Su Sohn, Minah Lee, Jihyun Hong

Advanced Energy Materials, 2022 · doi:10.1002/aenm.202202049

Contribution — Reaction product analysis — gas chromatography (GC)

§ equal contribution · * corresponding author

PATENT

Application No.	10-2023-0091712
Title of Invention	Catalyst for Low-Temperature Carbon Monoxide Purification, Method for Preparing the Same, and Method for Purifying Carbon Monoxide Using the Catalyst
Applicant	Korea Institute of Science and Technology (KIST)
Status	Filed (pending)
Inventor Status	Lead inventor
Contribution	Development of the catalyst and preparation method, reaction-system design, performance evaluation

RESEARCH PROJECTS

2022.12 - 2023.12 **Design of a high-pressure hydrogen compressor system based on solid-state hydrogen storage** — Hyundai Motor Company, Uiwang Research Institute, South Korea
Participant

2022.07 - present **Development of a vehicle-mounted hydrogen fuel-cell power system** — led by Hyundai Rotem, sub-project 2 led by Hyundai Motor Company (KEIT)
Participant · Phase 1 (2022–2024) complete, Phase 2 ongoing

2021.05 - 2022.02 **Novel CO2-free hydrogen extraction technology using liquid-phase catalysts** — Korea Evaluation Institute of Industrial Technology (KEIT), South Korea
Participant

2021.04 - 2022.04 **Development of core technologies for an on-board hydrogen generation system based on solid-state hydrogen storage** — Hyundai Motor Company, Uiwang Research Institute, South Korea
Participant

SCHOLARSHIPS & AWARDS

Scholarship

2021.03 - 2023.02 **President's Scholarship (KHU-KIST Scholarship)** — Kyung Hee University

Awards

2022.05.20 **Best Poster Presentation Award** — The Korean Hydrogen and New Energy Society (KHNES)

2022.11.10 **First Prize** — 1st Future Automotive Industry Idea Contest, Foundation of Korea Automotive Parts Industry Promotion (KAP; now the K-Mobility Bridge Foundation)

2025.07.09 **Encouragement Award** — 2nd Defense Materials & Parts R&D Requirements Competition, Korea Research Institute for Defense Technology Planning and Advancement (KRIT)
Team award

ANALYTICAL TOOLKIT

XPS — incl. Appl. Surf. Sci. 2024 · Chem. Eng. J. 2023

in-situ DRIFTS — incl. Science 2026 · Chem. Eng. J. 2025

GC-FID / GC-TCD — incl. Adv. Energy Mater. 2022 & 2025

XRD · TEM/SEM · TPx · MS · UV-Vis · TGA — day-to-day catalyst characterization

Plug-flow reactors — incl. Appl. Surf. Sci. 2024 · IJHE 2026

TEA / LCOH — incl. Cell Rep. Phys. Sci. 2024 · Chem. Eng. J. 2025

RESEARCH SOFTWARE

8 self-built tools running the lab's literature and data pipelines — from a Gmail-to-Notion literature radar (get-ASAP, now a public platform with hundreds of cumulative users) to an argument-graph engine over 296 papers.

Python · JavaScript · LLM pipelines · MCP

SELECTED PRESENTATIONS

Gordon Research Conference — Hydrogen-Metal Systems — poster (Switzerland, 2025)