

Seonggyun Kim

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SUMMARY

Chemical engineering graduate passionate about industry decarbonization and sustainable energy solutions. Experienced in process simulation, numerical modelling, and techno-economic analysis, with hands-on research expertise in carbon capture processes and hydrogen economy. Strong background in process optimization, energy storage, and industrial-scale applications of low-carbon technologies.

EDUCATION

KTH Royal Institute of Technology <i>M.Sc., Chemical Engineering for Energy and Environment</i>	Sep. 2025 (Expected) Stockholm, Sweden
<ul style="list-style-type: none">▪ Thesis: Dynamic process modeling for flexible production of green methanol (work in progress).▪ Fields of interest: Industrial energy processes, combined heat and power, process modelling and optimization, energy storage and conversion, industry decarbonization, carbon capture, and utilization.	
Hanyang University <i>B.S., Chemical Engineering</i>	Feb. 2023 Seoul, South Korea
<ul style="list-style-type: none">▪ Thesis: Simulation and optimization of MDEA-based CO₂ capture process using Aspen HYSYS.▪ Fields of interest: Thermodynamics, Reaction engineering, Process optimization.	
Nanyang Technological University <i>Summer Exchange Program</i>	Jul. 2018 Singapore
<ul style="list-style-type: none">▪ Completed “Introduction to Energy” course.	

WORK EXPERIENCE

AVEVA <i>Process Simulation Intern / Solver/Thermo Team, R&D Aveva Process Simulation</i>	Sep. 2024 – Nov. 2024 Lake Forest, California (Remote)
<ul style="list-style-type: none">▪ Expanded the thermodynamic database for AVEVA Process Simulation, enhancing industry adoption of advanced carbon capture technologies (Benfield process, AMP-PZ solvent).<ul style="list-style-type: none">○ Developed electrolyte-NRTL fluid/reaction models for K₂CO₃-CO₂-H₂O and AMP-PZ-CO₂-H₂O systems.○ Conducted thermophysical property regression using Python scripts to align with experimental data.▪ Built process simulation files for headless testing and prepared technical documents on carbon capture processes.	
Fraunhofer UMSICHT <i>Research Assistant / Department of Low Carbon Technologies</i>	Sep. 2022 – Feb. 2023 Oberhausen, Germany
<ul style="list-style-type: none">▪ “Ammonia to Hydrogen” project: a system-level analysis of ammonia decomposition process for hydrogen production.<ul style="list-style-type: none">○ Designed and optimized an Aspen PLUS process simulation for ammonia-to-hydrogen scenarios with techno-economic evaluation.○ Assembled and tested an electrically heated fixed-bed reactor for ammonia decomposition, optimizing temperature profiles based on activated carbon packing.	

ACADEMIC PROJECTS ([link](#))

Techno-economic Analysis of CCUS in Sweden (link)	Dec. 2024
<ul style="list-style-type: none">▪ Modeled MEA-based carbon capture and CO₂ hydrogenation processes using Aspen Plus V14.▪ Evaluated economic feasibility for storage and utilization scenarios in Sweden’s cement (Slite) and pulp (Korsnäs) industries.▪ Led methanol production process design, optimizing kinetic models and reporting leveled costs for breakeven analysis.	
AVEVA Process Simulation Academic Competition 2024 - Hydrogen Economy (link)	Feb. 2024
<ul style="list-style-type: none">▪ Designed a green ammonia synthesis process integrating solar hydrogen production in AVEVA Process Simulation.▪ Optimized heat integration using high- and low-pressure steam, comparing EAOC and NPV against pipeline transport.▪ The simulation and technical report entries in the three-part project won “Best Overall” prize in Europe.	

Metal Recovery Using Supercritical CO₂ ([link](#))

Feb. 2024

- Investigated scCO₂ extraction for recovering rare earth elements and heavy metals from coal fly ash, ores, and batteries.
- Demonstrated industrial potential with recovery rates up to 97% for uranium and 90% for rare earth elements.
- Assessed the technology readiness level (TRL 4) and selectivity challenges for industrial implementation.

Nickel-rich Electrodes for Li-ion Batteries ([link](#))

Dec. 2023

- Reviewed Ni-rich electrodes for lithium-ion batteries, highlighting their structural configurations, degradation mechanisms, and commercial applications.
- Identified performance limitations and degradation during cycling, and challenges in finding suitable electrolytes.
- Addressed the need to replace cobalt in existing electrodes and the overall impact on the commercial viability of Ni-rich materials.

Pressurized Pilot-scale Fluidized Bed Gasifier: A Risk Analysis ([link](#))

Dec. 2023

- Conducted a Preliminary Hazard Analysis (PHA) and What-if analysis on an existing gasification plant at KTH.
- Provided risk assessments and recommendations for process safety enhancements.

Thermodynamic Analysis of a Biomass-fueled Combined Heat and Power Plant with a Fuel Drier ([link](#))

Oct. 2023

- Thermodynamic analysis of the system components (compressors, turbines, heat exchangers, and a drier).
- Presented graphical results from pinch analysis and heat exchange calculations.
- Economic analysis based on different scenarios varying electricity, fuel, and green certificate prices.

Simulation and Optimization of MDEA-based CO₂ Capture Process ([link](#))

Jun. 2022

- Developed Aspen HYSYS simulations for process optimization and sensitivity analysis.
- Verified the relationship between absorber L/G ratio, CO₂ recovery, lean loading, and specific reboiler duty.

NRTL Parameter Optimization for Alkane/Sulfolane Binary Mixtures ([link](#))

Nov. 2021

- Optimized NRTL parameters to accurately calculate liquid-liquid equilibria using MATLAB.
- Achieved improved accuracy by adding a linear term to the τ term in the conventional model.

Estimation of Energy Penalty in Post-Combustion CCS ([link](#))

Jun. 2021

- Estimated energy consumption of CO₂ compression and refrigeration using Lee-Kesler equation of state programmed in MATLAB.
- Optimized compression processes for high-pressure storage and low-pressure transport pathways.

Eigenfaces: Face Recognition Machine Learning Algorithm ([link](#))

Dec. 2020

- Developed a face recognition machine learning algorithm in MATLAB using PCA and SVD.
- Trained on Yale_B dataset and successfully identified faces outside the training set.
- Applied dimensionality reduction and pattern recognition techniques for real-world image data. Built a face image recognition algorithm using MATLAB.

COMPUTER SKILLS

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- **Programming:** MATLAB, Python, Fortran, MS Excel VBA (Intermediate level); MS Visual C++, C (Basic level)
 - **Application:** AVEVA Process Simulation, Aspen HYSYS, Aspen PLUS, COMSOL; MS Office

LANGUAGES

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- Korean: Native
 - English: Proficient
 - Swedish: Beginner

OTHER

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- Hobbies: Jazz performance/composition, Linux ricing