



Woojin Bae

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Research Interests

Design and Fabrication of Nanomaterials through Advanced Techniques

- **Nanomaterials:** Perovskite, Zeolite, Metal Oxide, Nanoparticle.
- **Advanced Techniques:** Transmission Electron Microscopy, Autonomous Laboratories, AI-Driven synthesis

Education

Bachelor's degree in Chemical and Biological Engineering | **Seoul National University** **2020 - Present**

Exchange student in Chemical and Biomolecular Engineering | **North Carolina State University** **Spring 2025**

Major in Chemistry | **Daejeon Science High School for the Gifted** **2017 - 2020**

Research Experience

Self-Driving Fluidic Lab, NCSU (Advisor: Prof. Milad Abolhasani) **Jan. 2025 - May. 2025**

- Optimized Mn-doped perovskite quantum dots leveraging a Genetic Algorithm approach. *Raleigh, NC*
- Presented a poster at Spring Undergraduate Research & Creativity Symposium.

Multi-dimensional Materials Chemistry Lab, SNU (Advisor: Prof. Jungwon Park) **Mar. 2024 - Present**

- Synthesized Ag cluster-based AIGS (silver indium gallium sulfide)-core. *Seoul, Korea*
- Developed a DBSCAN-based protocol for quantitative analysis of SEI; SEI Structures Dependent Li-Morphology Characterized by cryo-TEM.
- Conceived and directed a collaborative project across SNU, NCSU, and ASU to optimize AI-driven synthesis of Mn-doped CsPb(Cl/Br)₃ nanocrystals, combining autonomous laboratories, cryo-TEM analysis, and DFT simulations.

Center for Cell-Encapsulation Research, KAIST (Advisor: Prof. Insung Choi) **Mar. 2018 - May. 2019**

- Created a porous titanium oxide shell to facilitate the in-vitro culturing of astrocytes. *Daejeon, Korea*
- Confirmed the function of encapsulated astrocytes by analyzing the length of co-cultured neurons.

Publications

Jinge Xu.; **Bae, W.**; Milad Abolhasani. *, Autonomous Mn-doped Perovskite Nanocrystals Synthesis by a Self-Driving Lab. *Manuscript in preparation*

Conference Presentations

Jinge Xu.; **Bae, W.**; Milad Abolhasani. *, Autonomous Mn-doped Perovskite Nanocrystals Synthesis by a Self-Driving Lab. *Spring Undergraduate Research & Creativity Symposium, Raleigh, NC, April 22-23, 2025.*

Bae, W.; Jung, S.; Ji, S.; Jeon, Y.; Park, J. *, SEI Structures Dependent Li-Morphology Characterized by Cryo-TEM. *The 2024 Annual Fall Conference of Korean Society of Microscopy, Gyeongju, Korea, Nov 25-26, 2024.*

Bae, W.; Lee, K.; Lee, C.; Kim, T.; Choi, I. *, Regulation of astrocyte growth using porous titanium oxide shells. *Korean Chemical Society Future Chemist Research Presentation, Daegu, Korea, Oct 19, 2018.*

Bae, W.; Lee, K.; Lee, C. *, Wettability Change of Self-Assembled Monolayers (SAMs) of Thiol on Gold. *The 51st Joint School Science Exhibition, Hong Kong, Hong Kong, Aug 22-27, 2018.*

Selected Honors & Awards

Research Grant | Undergraduate Research Support Program, SNU College, SNU **May. 2025**

- Selected a **\$2000 research grant** for a collaborative project between SNU, NCSU, and ASU.

Summer Research Initiative | Arizona State University, Tempe, AZ **May. 2025 – Jul. 2025**

- Awarded a competitive **\$5000 research fellowship** under the mentorship of Prof. Sandhya Susarla

Excellence Undergraduate Research Award | 2024 Student-Directed Education Program Symposium **Jan. 2025**

- Recognized for outstanding research on SEI structures dependent Li-morphology characterized by Cryo-TEM.

Korea-U.S. Student STEM Exchange Scholarship | Ministry of Trade, Industry and Energy, Korea **Nov. 2024**

- Awarded national **\$9000 scholarship** as a STEM-specialized exchange student.

Excellence Award | Undergraduate Research Program for Advanced Equipment, SNU **Jan. 2024**

- Awarded for excellence in undergraduate research on hollow ZSM-5 synthesis.

The Education and Research Foundation Scholarship College of Engineering, SNU	Spring 2021
2020 Future Chemistry Talent Award The Korean Union of Chemical Science and Technology Societies	Feb. 2020
<ul style="list-style-type: none"> Selected as one of the top 6 science high school students nationwide. 	
POSTECH Presidential Award 2019 R&E Joint Symposium for Gifted High School Students	Jan. 2019
<ul style="list-style-type: none"> Awarded for outstanding poster presentation on astrocyte growth regulation using porous titanium oxide shells. 	
Leadership	
Tokyo Forum Youth Session The University of Tokyo & Chey Institute for Advanced Studies, Japan	Fall 2024
<ul style="list-style-type: none"> Representative of Korea, participated in the wrap-up session hosted by the President of the University of Tokyo. 	
HKUST Entrepreneurship Bootcamp 2024 Hong Kong University of Science and Technology, Hong Kong	Jul. 2024
<ul style="list-style-type: none"> Led a global team in a mock-up competition and secured third prize among international participants. 	
Marketing team & manager SNUfestival, Student council-affiliated organization, SNU	Jun. 2021 - May. 2022
<ul style="list-style-type: none"> Promoted the festival through the online website and secured sponsorship from a shared scooter company during the first in-person festival after the COVID-19 pandemic. 	
Vice president Chemical and Biological Engineering Interim Leadership, SNU	Dec. 2020 - Mar. 2021
<ul style="list-style-type: none"> Conducted freshman orientation, via Zoom during the COVID-19 pandemic. 	
Membership & Activities	
Undergraduate Membership Korean-American Scientists and Engineers Association	Jan. 2025 – Present
<ul style="list-style-type: none"> A non-profit organization that fosters collaboration among Korean-American scientists and engineers. Delivered a research presentation at Katalyst 2025, a nationwide Korean-American undergraduate conference. 	
Young Engineers Honor Society National Academy of Engineering of Korea	Nov. 2024 - Present
<ul style="list-style-type: none"> Korean engineering honor society under National Academy of Engineering of Korea. 	
2023 Winter Vacation Data Science Bootcamp: Computing Graduate School of Data Science, SNU	Feb. 2024
Republic of Korea Air Force 11th Fighter Wing, Daegu, Korea	Aug. 2022 - May. 2024
<ul style="list-style-type: none"> F-15K Slam Eagle Squadron. Selected as an exemplary soldier. 	
SNU in EU program Brussels School of Governance, Belgium	Jul. 2022
<ul style="list-style-type: none"> Understanding European Unions, delivered a presentation titled "The European External Action Service". 	
Kansas Academy of Mathematics and Science Research Program Fort Hays State University, Hays, KS	Jul. 2018
<ul style="list-style-type: none"> Synthesized ZnSe quantum dots and applying them on Dye-sensitized solar cell. (Advisor: Prof. Arvin J. Cruz) 	
Teaching & Mentoring Experiences	
Korean Language Peer Mentor Language Education Institute, SNU	Fall 2024
Learning Assistant Faculty of Liberal Education, SNU	Fall 2024
<ul style="list-style-type: none"> Basic Computing: First Adventures in Computing, L0444.000400. 	
Lecturer, TEM Seminar Multi-dimensional Materials Chemistry Lab, SNU	May. 2024
<ul style="list-style-type: none"> Amplitude and Phase Contrast. 	
Student Mentor, SNU Mentoring Seoul National University Social Responsibility	Apr. 2023 - Present
<ul style="list-style-type: none"> Provided career guidance to the middle school student from underserved communities, selected as a superb mentor. 	
Technical Skills & Languages	
<ul style="list-style-type: none"> Instruments: TEM, SEM, UV-Vis, OM, PL Programming Languages: Python, MATLAB, C, HTML Software: Adobe Premiere Pro, Adobe Illustrator, Fusion 360, Gatan DigitalMicrograph, Git Languages: Korean (Native), English (C1, TOEFL 95) 	