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**
Expected honor: *Cum Laude*

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**
High school for gifted students in science and mathematics

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.

Honors & Awards

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

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

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

- Awarded a **$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**
- 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**
- 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**
- **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**
- **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**
- 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**
- **Conducted freshman orientation**, via Zoom during the COVID-19 pandemic.

Membership & Activities

Undergraduate Membership | Korean-American Scientists and Engineers Association **Jan. 2025 - Present**
- 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**
- 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**
- F-15K Slam Eagle Squadron. Selected as an **exemplary soldier**.

SNU in EU program | Brussels School of Governance, Belgium **Jul. 2022**
- 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**
- 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**
- Basic Computing: First Adventures in Computing, L0444.000400.

Lecturer, TEM Seminar | Multi-dimensional Materials Chemistry Lab, SNU **May. 2024**
- Topic: Amplitude and Phase Contrast.

Student Mentor, SNU Mentoring | Seoul National University Social Responsibility **Apr. 2023 - Present**
- Provided career guidance to the students from underserved communities, selected as an **outstanding mentor**.

Technical Skills & Languages

- **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)