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.

EDUCATION

Seoul National University (SNU), Seoul, South Korea **Expected Aug. 2026**

B.S. Chemical and Biological Engineering *(CBE), Cum Laude* (*expected*)

- GPA: 3.72/4.3 (overall), 3.67/4.0 (converted)

North Carolina State University (NCSU), Raleigh, NC **May 2025**

Exchange student in Chemical and Biomolecular Engineering

- GPA: 4.0/4.0, AIChE at NC State

Daejeon Science High School for the Gifted, Daejeon, South Korea **Feb. 2020**

High School for gifted students in science and mathematics

RESEARCH EXPERIENCE

Multi-dimensional Materials Chemistry Lab, SNU **Mar. 2024 – Present**

Undergraduate Researcher - *(30h/week)* (Advisor: Prof. Jungwon Park) *Seoul, Korea*

- Developed a DBSCAN-based protocol for quantitative analysis of SEI; SEI Structures Dependent Li-Morphology Characterized by cryo-TEM.
- Initiated and led **a collaborative project** across SNU and NCSU to optimize AI-driven synthesis of Mn-doped $CsPb(Cl/Br)_3$ QDs, combining autonomous laboratories and TEM analysis.

Summer Undergraduate Initiative (SURI), ASU **May 2025 – Jul. 2025**

Undergraduate Researcher - *(30h/week)* (Advisor: Prof. Sandhya SuSarla) *Tempe, AZ*

- Selected for the **SURI fellowship** at Arizona State University ($5000 stipend).
- Synthesized perovskite nanocrystals with controlled morphologies to investigate phonon–polariton coupling with hexagonal boron nitride (hBN).
- Presented a poster at Summer Research Initiative Final Research Showcase.

Self-Driving Fluidic Lab, NCSU **Jan. 2025 – May 2025**

Undergraduate Researcher - *(10h/week)* (Advisor: Prof. Milad Abolhasani) *Raleigh, NC*

- Achieved Photoluminescence Quantum Yield (PLQY) improvement of Mn-doped $CsPb(Cl/Br)_3$ perovskite through genetic algorithm-based synthesis optimization in autonomous lab.
- Presented a poster at Spring Undergraduate Research & Creativity Symposium.

Center for Cell-Encapsulation Research, KAIST **Mar. 2018 – May 2019**

Highschool R&E Researcher - *(30h/week)* (Advisor: Prof. Insung Choi) *Daejeon, Korea*

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

PUBLICATION / PRESENTATION

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

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 for a **$2000 Research Grant** for a collaborative project across SNU and NCSU.

Excellence Research Award | 2024 Student-Directed Education Program Symposium **Jan. 2025**
- Outstanding research on SEI structures dependent Li-morphology characterized by Cryo-TEM.

Korea-U.S. 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**
- Investigated the relationship between microscopic and macroscopic morphology of hollow ZSM-5 under various synthesis conditions, utilizing TEM, SEM, and XRD.

Team Section Winner | We Change SNU Contest, SNU **Jul. 2022**
- A spatial-restricted messenger allowing messages to be accessed only at SNUfestival locations designated by the sender.

The Education and Research Foundation Scholarship | College of Engineering, SNU **Spring 2021**

2020 Future Chemistry Talent Award | KUCST, The Korean Chemical Society **Feb. 2020**
- Selected as one of the **top 6 science high school students nationwide**.

POSTECH Presidential Award | 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, Japan **Fall 2024**
- **Representative of Korea**, in a session on Aging Society and Low Birth Rate.
- Participated in the wrap-up session hosted by the President of the University of Tokyo.

HKUST Entrepreneurship Bootcamp | Hong Kong University of Science and Technology **Jul. 2024**
- **Led a global team** in a mock-up competition and won **third prize** for developing a worldwide healthcare platform among international participants.

Marketing manager | SNUfestival, Student council organization, SNU **Jun. 2021 – May 2022**
- Promoted the festival through the **online website** and secured **$2200 sponsorship** from a shared scooter company during the first in-person festival after the COVID-19 pandemic.

Vice president | CBE Interim Leadership, SNU **Dec. 2020 – Mar. 2021**
- **Developed an online program** for incoming freshman during the COVID-19 pandemic.

MEMBERSHIP & ACTIVITIES

Undergraduate Member | 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.

SNU-UMN Culture Exchange Program | The University of Minnesota, Minneapolis, MN **Mar. 2024**

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, Understanding European Union | Brussels School of Governance, Belgium **Jul. 2022**

- Study Abroad Program, delivered a presentation titled "The European External Action Service".

Kansas Academy of Mathematics and Science | 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**

Peer Tutor | Basic Computing: First Adventures in Computing, SNU **Fall 2024**

Lecturer, TEM Seminar | Multi-dimensional Materials Chemistry Lab, SNU **May 2024**

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 (Certified ML Specialization, Coursera), MATLAB, C
- **Software:** Gatan DigitalMicrograph, clTEM, Git, Adobe, Fusion 360
- **Languages**: Korean (Native), English (C1, TOEFL 95)