

# Woojin Bae

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## RESEARCH INTERESTS

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### Design and Fabrication of Nanomaterials through Advanced Techniques

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

## EDUCATION

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**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

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**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)<sub>3</sub> QDs, through TEM analysis and DFT calculation.

**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)<sub>3</sub> 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

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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

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**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

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**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

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**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**

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**Korean Language Peer Mentor** | Language Education Institute, SNU     **Fall 2024**

**Peer Tutor** | Basic Computing: First Adventures in Computing, SNU     **Fall 2024, Fall 2025**

**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**

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- **Instruments:** TEM, SEM, UV-Vis, OM, PL
  - **Programming Languages:** Python (Certified ML Specialization, Coursera), MATLAB, C
  - **Software:** Gatan DigitalMicrograph, VASP, Aveva Process Simulation, Git, Adobe, Fusion 360
  - **Languages:** Korean (Native), English (C1, TOEFL 103)