



# 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**

## 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)<sub>3</sub> 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 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)