

# Woojin Bae

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## Research Interests

### Investigation of Nanomaterials through Advanced Analytical Techniques

- **Nanomaterials:** Perovskite, Zeolite, Metal Oxide, Nanoparticle.
- **Advanced Analytical Techniques:** Transmission Electron Microscopy, Self-Driving Labs.

## 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

**Jan. 2025 - May. 2025**

Undergraduate Researcher (Advisor: Prof. Milad Abolhasani)

*Raleigh, NC*

- Synthesized Mn-doped perovskite quantum dots (PQDs) leveraging a self-driving approach (ongoing)

### Multi-dimensional Materials Chemistry Lab, SNU

**Mar. 2024 - Present**

Undergraduate Researcher (Advisor: Prof. Jungwon Park)

*Seoul, Korea*

- Synthesized Ag cluster-based AIGS (silver indium gallium sulfide)-core.
- SEI Structures Dependent Li-Morphology Characterized by cryo-TEM; developed a protocol for quantitative analysis of SEI.
- **Team Leader** of "Undergraduate Independent Study 1" regarding LMBs SEI Cryo-TEM analyzing.

### Center for Cell-Encapsulation Research, KAIST

**Mar. 2018 - May. 2019**

R&E Researcher (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.

## Conference Presentations

†: equally contributed, \*: corresponding author

SEI Structures Dependent Li-Morphology Characterized by Cryo-TEM. **Bae, W.**<sup>†</sup>; Jeong, S.<sup>†</sup>; Ji, S.<sup>†</sup>; Jeon, Y.; Park, J.\*

*The 2024 Annual Fall Conference of Korean Society of Microscopy*, Gyeongju, Korea (Nov 25, 2024). Poster Presentation.

Rethinking Life Choices Beyond the Child Penalty. **Bae, W.**<sup>†</sup>; Miu Akutsu.<sup>†</sup>; Park, J.<sup>†</sup>; Xing Qing.<sup>†</sup>

*Tokyo Forum 2024: Shape the Future, Design for Tomorrow*, Tokyo, Japan (Nov 22-23, 2024). Oral Presentation.

Regulation of astrocyte growth using porous titanium oxide shells. **Bae, W.**; Lee, K.; Lee, C.; Kim, T.; Choi, I.\*

*Korean Chemical Society Future Chemist Research Presentation*, Daegu, Korea (Oct 19, 2018). Poster Presentation.

Wettability Change of Self-Assembled Monolayers (SAMs) of Thiol on Gold. **Bae, W.**; Lee, K.; Lee, C.\*

*The 51st Joint School Science Exhibition*, Hong Kong, Hong Kong (Aug 22-27, 2018). Poster Presentation

## Honors & Awards

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

**Jan. 2025**

- SEI Structures Dependent Li-Morphology Characterized by Cryo-TEM.

**Korea-U.S. Student Exchange Program in the field of high-tech industry** | Ministry of Trade, Industry and Energy

**Nov. 2024**

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

**Excellence Award** | Undergraduate Research Program for Advanced Equipment

**Jan. 2024**

- Consideration on the relationship between microscopic structure and macroscopic shape according to the synthesis conditions of Hollow ZSM-5.

**Team Section Winner** | We Change SNU Contest

**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**

**Merit-based Scholarship** | Department of Chemical and Biological Engineering, SNU

**Fall 2020**

**2020 Future Chemistry Talent Award** | The Korean Union of Chemical Science and Technology Societies

**Feb. 2020**

- Awarded as one of the **top 6 science high school students** in Korea

**Excellence Poster Award** | 2019 Gifted School R&E Joint Presentation Conference

**Jan. 2019**

- Regulation of astrocyte growth using porous titanium oxide shells.

<b>Honorable Mention</b>   2017 Science Gifted and Talented Creative Research Conference	<b>Jan. 2018</b>
<ul style="list-style-type: none"> <li>• Correlation between Z-potential and contact angle of AuNPs solution.</li> </ul>	

## Leadership

<b>Tokyo Forum Youth Session</b>   The University of Tokyo & Chey Institute for Advanced Studies, Japan	<b>Aug. 2024 - Nov. 2024</b>
<ul style="list-style-type: none"> <li>• <b>Representative of Korea</b>, participated in the wrap-up session hosted by the President of the University of Tokyo.</li> </ul>	

<b>HKUST Entrepreneurship Bootcamp 2024</b>   Hong Kong University of Science and Technology, Hong Kong	<b>Jul. 2024</b>
<ul style="list-style-type: none"> <li>• Participated in a mock-up competition as a <b>team leader</b> and won the <b>third prize</b> for a worldwide healthcare platform.</li> </ul>	

<b>Marketing team &amp; manager</b>   SNUfestival, Student council-affiliated organization, SNU	<b>Jun. 2021 - May. 2022</b>
<ul style="list-style-type: none"> <li>• Promoted the festival through the <b>online website</b> and video during the COVID-19 pandemic.</li> <li>• <b>Secured sponsorship</b> from a shared scooter company during the first in-person festival after the COVID-19 pandemic.</li> </ul>	

<b>Vice president</b>   Chemical and Biological Engineering Interim Leadership, SNU	<b>Dec. 2020 - Mar. 2021</b>
<ul style="list-style-type: none"> <li>• <b>Conducted freshman orientation</b>, via Zoom during the COVID-19 pandemic.</li> </ul>	

## Membership & Activities

<b>Undergraduate Membership</b>   Korean-American Scientists and Engineers Association	<b>Jan. 2025 – Present</b>
<ul style="list-style-type: none"> <li>• A non-profit organization that fosters collaboration and networking among Korean-American scientists and engineers.</li> </ul>	

<b>Young Engineers Honor Society</b>   National Academy of Engineering of Korea	<b>Nov. 2024 - Present</b>
<ul style="list-style-type: none"> <li>• Korean engineering honor society under National Academy of Engineering of Korea.</li> </ul>	

<b>SNU-UMN Culture Exchange Program</b>   The University of Minnesota, Minneapolis, MN	<b>Mar. 2024</b>
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2023 Winter Vacation Data Science Bootcamp: <b>Computing</b>   Graduate School of Data Science, SNU	<b>Feb. 2024</b>
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<b>Republic of Korea Air Force</b>   Daegu, Korea	<b>Aug. 2022 - May. 2024</b>
<ul style="list-style-type: none"> <li>• 110<sup>th</sup> Squadron, operating the F-15K Slam Eagle. Selected as an <b>exemplary soldier</b>.</li> </ul>	

<b>SNU in EU program</b>   Brussels School of Governance, Belgium	<b>Jul. 2022</b>
<ul style="list-style-type: none"> <li>• Understanding European Unions, M2170.004600, delivered a presentation titled "The European External Action Service".</li> </ul>	

<b>Kansas Academy of Mathematics and Science Research Program</b>   Fort Hays State University, Hays, KS	<b>Jul. 2018</b>
<ul style="list-style-type: none"> <li>• Synthesized ZnSe quantum dots and applying them on Dye-sensitized solar cell. (Advisor: Prof. Arvin J. Cruz)</li> </ul>	

## Teaching & Mentoring Experiences

<b>Korean Language Peer Mentor</b>   Language Education Institute, SNU	<b>Fall 2024</b>
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<b>Learning Assistant</b>   Faculty of Liberal Education, SNU	<b>Fall 2024</b>
<ul style="list-style-type: none"> <li>• Basic Computing: First Adventures in Computing, L0444.000400.</li> </ul>	

<b>Lecturer, TEM Seminar</b>   Multi-dimensional Materials Chemistry Lab, SNU	<b>May. 2024</b>
<ul style="list-style-type: none"> <li>• Amplitude and Phase Contrast.</li> </ul>	

<b>Student Mentor, SNU Mentoring</b>   Seoul National University Social Responsibility	<b>Apr. 2023 - Present</b>
<ul style="list-style-type: none"> <li>• Provided career guidance to the middle school student from underserved communities, selected as a <b>superb mentor</b>.</li> </ul>	

## Skills & Languages

- **Instruments:** TEM, SEM, UV-Vis, OM, PL
- **Languages:** Korean (Native), English (C1, TOEFL 95)
- **Programming Languages:** Python, C, Html, CSS
- **Software:** Adobe Premiere Pro, Adobe illustrator, Fusion 360, Gatan DigitalMicrograph