



# 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**

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 machine learning-based protocol for quantitative analysis of SEI; SEI Structures Dependent Li-Morphology Characterized by cryo-TEM.
- Collaborated 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** | SNU College, SNU **May. 2025**

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

**Summer Research Initiative** | Arizona State University **May. 2025 – Jul. 2025**

- Awarded a competitive **\$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 **Nov. 2024**

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

**Excellence Award** | Undergraduate Research Program for Advanced Equipment **Jan. 2024**

- Awarded for excellence in undergraduate research on hollow ZSM-5 synthesis.

<b>The Education and Research Foundation Scholarship</b>   College of Engineering, SNU	<b>Spring 2021</b>
<b>2020 Future Chemistry Talent Award</b>   The Korean Union of Chemical Science and Technology Societies	<b>Feb. 2020</b>
<ul style="list-style-type: none"> <li>Selected as one of the <b>top 6 science high school students nationwide</b>.</li> </ul>	
<b>Excellence Poster Award</b>   2019 Gifted School R&E Joint Presentation Conference	<b>Jan. 2019</b>
<ul style="list-style-type: none"> <li>Awarded for outstanding poster presentation on astrocyte growth regulation using porous titanium oxide shells.</li> </ul>	
<b>Leadership</b>	
<b>Tokyo Forum Youth Session</b>   The University of Tokyo & Chey Institute for Advanced Studies, Japan	<b>Fall 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>.</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> 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>	
<b>Membership &amp; Activities</b>	
<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 among Korean-American scientists and engineers.</li> <li>Delivered a research presentation at <b>Katalyst 2025</b>, a nationwide Korean-American undergraduate conference.</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>2023 Winter Vacation Data Science Bootcamp: Computing</b>   Graduate School of Data Science, SNU	<b>Feb. 2024</b>
<b>Republic of Korea Air Force</b>   Daegu, Korea	<b>Aug. 2022 - May. 2024</b>
<ul style="list-style-type: none"> <li>F-15K Slam Eagle Squadron. 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, 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>	
<b>Teaching &amp; Mentoring Experiences</b>	
<b>Korean Language Peer Mentor</b>   Language Education Institute, SNU	<b>Fall 2024</b>
<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>	
<b>Technical Skills &amp; Languages</b>	
<ul style="list-style-type: none"> <li><b>Instruments:</b> TEM, SEM, UV-Vis, OM, PL</li> <li><b>Programming Languages:</b> Python, MATLAB, C, HTML</li> <li><b>Software:</b> Adobe Premiere Pro, Adobe Illustrator, Fusion 360, Gatan DigitalMicrograph, Git</li> <li><b>Languages:</b> Korean (Native), English (C1, TOEFL 95)</li> </ul>	