



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**
• Synthesized Mn-doped perovskite quantum dots leveraging a self-driving 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 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)₃ 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. (Poster Presentation)*

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. (Poster Presentation)*

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. (Poster Presentation)*

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. (Poster Presentation)*

Selected Honors & Awards

Summer Research Initiative Fellowship | Arizona State University, Tempe, AZ **May. 2025 – Jul. 2025**
• Awarded a competitive full-time 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.

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**.

Excellence Poster Award | 2019 Gifted School R&E Joint Presentation Conference **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 **Aug. 2024 - Nov. 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**
- Participated in a mock-up competition as a **team leader** and won the **third prize** for a worldwide healthcare platform.
- Marketing team & manager** | SNUfestival, Student council-affiliated organization, SNU **Jun. 2021 - May. 2022**
- Promoted the festival through the **online website** and video during the COVID-19 pandemic.
 - **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 and networking 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** | 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, M2170.004600, 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**
- Amplitude and Phase Contrast.
- Student Mentor, SNU Mentoring** | Seoul National University Social Responsibility **Apr. 2023 - Present**
- Provided career guidance to the middle school student from underserved communities, selected as a **superb mentor**.

Technical Skills & Languages

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