Hanna Cho

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Skills

Programming Python (PySCF, PyTorch, NumPy, Jupyter notebook, etc.), Julia, SQL, ML, R, HTML, JavaScript.
Laboratory HPLC, Spectroscopy, NMR, Centrifuging, Multistep synthesis, purification, separation, extraction.
Miscellaneous Linux, Shell (Bash/Zsh), LaTeX(Overleaf/R Markdown), Microsoft Office, Git, ChemDraw.

Education

Virginia Polytechnic Institute and State University *Blacksburg, Virginia*
MS, Chemistry; Advisor: Nicholas Mayhall *Aug 2021 - May 2024*

- **Courses:** Advanced Quantum Optics Qubit Processors, Advanced Quantum Information Technologies, Numerical Analysis and Software, Electronic Structure Theory, Chemical Thermodynamics, Quantum Chemistry and Spectrometry, Advanced Inorganic Chemistry

Seoul National University of Science and Technology *Seoul, South Korea*
MS, Chemistry; Advisor: Cheal Kim *Mar. 2017 - Mar. 2020*

- **Thesis:** Synthesis and application of a chemosensor for detecting various metal ions with high selelctivity

BS, Chemistry *Mar. 2013 - Mar. 2017*

Research Experience

Singlet-fission; *Ab Initio* methods and quantum information science *Blacksburg, VA*
Research Assistant, Virginia Polytechnic Institute and State University *Dec 2021 - Mar 2024*

- Utilizing IBM Qiskit to demonstrate quantum algorithms such as phase estimation or Grover's algorithm, alongside a study of the singlet fission process in organic molecules with a model Hamiltonian in various environments, including processed magnetic fields, for potential applications in quantum information.
- Quantum chemistry *Ab Initio* calculations for large molecules, using PySCF and Python codes to find the active space that can capture most of the energy related to the singlet fission process.
- **Technical Skills:** Python, Julia, Bash, Overleaf, LaTeX.

Structural biology: preparation of protein sample and graphene oxide *Ann Arbor, MI*
Visiting scholar, University of Michigan *Jan 2019 - Jan 2020*

- Conducted surface functionalization of graphene oxide to capture target protein samples using Cryogenic Electron Microscopy (cryo-EM), collaborating with the chemical engineering department.
- Collaborated with post-docs in a research group on an ongoing project, focusing on preparing proteins for the study of the histone complex structure. My role involved optimizing multi-step cell culture and purification conditions to ensure maximum efficacy.
- **Technical Skills:** Polymerase chain reaction (PCR), HPLC, autoclave, various chromatography methods including size exclusion, ion exchange, and affinity.

Study of the molecular sensor *Seoul, South Korea*
Research Assistant, Seoul National University of Science and Technology *Jan 2017 - Mar 2018*

- Designed and developed a novel organic molecule with selective binding properties for environmental contaminants in water, including metal ions and anions.
- Performed analysis on ligands and ligand-analyte complexes using spectrometers and Density Functional Theory (DFT) with software (Gaussian) and further applied the findings in in vivo conditions.
- **Technical Skills:** fluorescence, UV-vis, FT-IR, ^{1}H and ^{13}C NMR and ESI-mass spectroscopy, DFT.

Work Experience

Virginia Polytechnic Institute and State University *Blacksburg, Virginia*

Graduate Teaching Assistant: Physical Chemistry Laboratory *Aug 2021-May 2022, Jan 2023-May 2023*

- This senior-level physical chemistry laboratory class consisted of one week of lectures followed by a week of laboratory experiments. Responsibilities included preparing and delivering lectures, creating and supervising laboratory activities for students, evaluating student performance, and maintaining classroom records.

Virginia Polytechnic Institute and State University *Blacksburg, Virginia*

Graduate Teaching Assistant: General Chemistry Laboratory *Aug 2023-May 2024*

- Instructed a freshman-level general chemistry laboratory class, assisting students in acclimating to the lab setup, enforcing safety protocols, and providing motivation throughout the sessions.

Jeju Research Institute: Marine Policy *Jeju, South Korea*

Research Assistant *Mar 2020-Jun 2020*

- Researching legal cases worldwide concerning the marine environment. Collaborated closely with the team to develop case theories and propose new policies tailored to specific situations.

Additional Experience

MQM 2022 *Blacksburg, Virginia*

Volunteer Conference Organizer *June 26 - July 1, 2022*

- Set up and organized the 10th Triennial Conference on Molecular Quantum Mechanics. Assisted visitors and speakers throughout the event.

Languages

English Professional proficiency
Korean Native proficiency