Qi, Runyu

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EDUCATION

University of Illinois Urbana-Champaign *Illinois, United States* *Aug.2023 - Dec.2024*

- M.S. in Material Science and Engineering

Tsinghua University *Beijing, China* *Sept.2019 - Jun.2023*

- B.E. in Material Science and Engineering

CURRENT RESEARCH

Deep Learning on Pathway Prediction and GPCRs MD Simulation
Advisor: Prof. Diwakar Shukla (UIUC) *Individual Study* *Jan. 2024 - Present*

- Conducted molecular dynamics (MD) simulations of G protein-coupled receptors (GPCRs) to study their structural dynamics and interactions.
- Implemented deep learning techniques, including neural networks, to predict biological pathways associated with GPCRs and analyze their molecular dynamics at the atomic level.

mRNA Cancer Vaccine and Cell Metabolic Labeling & Targeting
Advisor: Prof. Hua Wang (UIUC) *Research Assistant* *Sept. 2023 - Present*

- Assisted in the in vitro experiment of stem cells and dendritic cells mRNA transfection, contributing to the development of mRNA-based cancer vaccines.
- Conducted experiments to optimize the labeling of immune cells and cancer cells with unnatural monosaccharides, enabling targeted metabolic labeling and tracking of cellular processes.

PREVIOUS RESEARCH EXPERIENCE

Surface-Enhanced Raman Spectroscopy and Electrochemical Detection of Energetic Materials
Advisor: Prof. Yunhan Ling (Tsinghua Univ.) *Bachelor Thesis* *Feb. 2023 - Jun. 2023*

- Developed sensors with Surface-Enhanced Raman Spectroscopy (SERS) and electrochemical detection capabilities through the preparation of nanogold SERS substrates, surface modifications, and performance characterization.
- Attained quantitative detection of methylene blue and perchlorate with remarkably low minimum quantification limits.
- Formulated a TNT molecularly imprinted polymer electrode and achieved detection with impressively low minimum detection limits.

Nano ZrO_2 Reinforced Dental PMMA-Based Resin for Additive Manufacturing
Advisor: Tao Lin (Tsinghua Univ.) *Enterprise Project* *Oct. 2022 - Dec. 2022*

- Conducted experiments to enhance the surface properties of nano ZrO_2 and resin compounds, aiming to develop a biocompatible resin with improved strength and modulus.
- Formulated a high-precision resin specifically for restorative dental models, utilizing a DLP 3D printer to fabricate human teeth models. Investigated the reinforcing mechanism via SEM analysis.

Finite Element Method (FEM) Simulation and Automation Development for Autoclaves
Independent Research *Competition Program Apr. 2022 - Jun. 2022*

- Undertook a two-month project encompassing industry research, software training, and modeling, calculation, and simulation.
- Created Python automation scripts and graphical extensions to optimize the modeling process, leading to significant time and cost reductions.
- Presented the project with illustrative video examples and secured second prize in a prestigious competition.

3D Printing of Glass Fiber Reinforced Plastic by Stereolithography
Advisor: Rongxuan Liu (Tsinghua Univ.) *Student Research Training Sept. 2021 - Jan. 2022*

- Investigated methods to enhance the strength of 3D-printed workpieces using continuous fiber composites, through extensive literature review and exploration of industry solutions.
- Replicated experiments utilizing diverse materials and equipment, iteratively refining methods and adjusting process parameters based on experimental outcomes. Analyzed tensile break mechanisms using SEM cross-sections.
- Conducted over 20 controlled trials, achieving a twofold increase in tensile strength while maintaining high-quality standards. Fabricated workpieces utilizing a desktop LCD 3D printer.

Development of Metallic Glass Full-spectrum Visible-light Filter
Advisor: Prof. Na Chen (Tsinghua Univ.) *Student Research Training Dec. 2020 - Sept. 2021*

- Mastered magnetron sputtering techniques to deposit amorphous alloy films onto silicon/silicon oxide and titanium alloy surfaces.
- Engineered metallic glass films with exceptional hardness and high transmittance, manipulating their optical properties through controlled oxygen exposure.
- Developed an innovative adhesion method, enhancing product surfaces with films known for their superior hardness, wear resistance, and color enhancement.

PVDF-based Piezoelectric Composites
Advisor: Prof. Yang Shen (Tsinghua Univ.) *Research Assistant Nov. 2020 - Sept. 2021*

- Supported a Ph.D. candidate in various tasks, including the preparation of solutions and PVDF precursor, fabrication of foam ceramic bodies, and maintenance of experimental equipment.
- Participated in group meetings to acquire knowledge of research methodologies and advancements in the field, ensuring alignment with the latest developments.

ACTIVITIES

Captain, Student Network Service Work-study Team, Tsinghua Univ. *Mar. 2021 - Jun. 2023*

- Coordinated a team of student workers responsible for IT services center support for faculty, staff, and students.
- Managed official accounts and team websites to ensure effective communication and timely updates.
- Provided technical assistance with PC issues and contributed to network operation and maintenance of campus buildings.

President, Future Sci-tech Interests Club, Tsinghua Univ. *Sept. 2022 - Jun. 2023*

- Managed GPU servers and organized activities for the club, fostering a community of technology enthusiasts.
- Facilitated communication with industry professionals, including HR representatives from companies, to provide club members with opportunities to network and learn about careers in science and technology.
- Led a program to develop a low-power, portable network monitoring device using Python, which visualized signals and monitored connection status.

Volunteer, Olympic and Paralympic Winter Games, Beijing *Feb. 2022 - Mar. 2022*

- Served as an Event Services volunteer at the Beijing National Stadium (Bird's Nest) during the Games' opening and closing ceremonies.
- Guided spectators on the stands and conducted ticket checks in the corridor, ensuring a safe and enjoyable experience for all attendees.

PRESENTATIONS

A Review on PDMS-based Electronic Skin and Self-healing Property
Advisor: Prof. Lilian Hsiao (NC State) *Virtual Research Program Jul. 2022 - Aug. 2022*

- Conducted an extensive literature review on PDMS and electronic skins, analyzing over 10 research papers. Synthesized findings into an academic poster and collaborated with a professor and Ph.D. candidate to refine content. Delivered a successful video presentation.
- Developed expertise in English literature reviews, academic poster creation, and presentation delivery. Received top honors for the project's evaluation, focusing on PDMS and electronic skins.

AWARDS

The Tsinghua Univ. Technological Innovation Scholarship *2022*
The second prize, 3^{rd} Virtual Simulation Creative Design Competition *2022*
The first prize, 5^{th} Tsinghua Univ. 3D Printing Skills Competition *2021*
The Tsinghua Univ. Excellent Art Scholarship *2021*
The second prize, 4^{th} Tsinghua Univ. 3D Printing Skills Competition *2020*