CHENWEI ZHANG

226-939-2222 | Vancouver, BC | zhang.chenwei@hotmail.com | https://chwzhang.com | LinkedIn | GitHub

EDUCATION

University of British Columbia — Vancouver, BC, Canada
Doctor of Philosophy in Computer Science — *Sept. 2021 – Expected Aug. 2025*

University of Waterloo — Waterloo, ON, Canada
Master of Science in Chemistry (Nanoscience), GPA: 4.0/4.0 | TOP 1% — *Sept. 2018 – Feb. 2021*

University of Waterloo — Waterloo, ON, Canada
Bachelor of Science in Nanoscience (Dean's Honours List), GPA: 3.90/4.0 | TOP 5% — *Sept. 2015 – Aug. 2018*

Beijing Jiaotong University — Beijing, China
Bachelor of Engineering in Nanotechnology, GPA: 3.90/4.0 | TOP 5% — *Sept. 2015 – Jul. 2017*

RESEARCH EXPERIENCE

Research Assistant | Supervisor: Prof. Anne Condon & Prof. Khanh Dao Duc — From Jun. 2023
University of British Columbia — *Vancouver, BC, Canada*

- **Paper** *A comprehensive survey and benchmark of deep learning-based methods for atomic model building from cryo-EM density maps* is submitted to a peer-reviewed journal.
- **Paper** *Synthetic High-resolution Cryo-EM Density Maps with Generative Adversarial Networks* is submitted to a peer-reviewed conference.
- Developed generative models including GANs and diffusion models to solve biological problems, such as protein structure modelling.

Research Assistant | Supervisor: Prof. Anne Condon — From Sept. 2021
University of British Columbia — *Vancouver, BC, Canada*

- **Paper** *ViDa: Visualizing DNA hybridization trajectories with biophysics-informed deep graph embeddings* was accepted to Machine Learning in Computational Biology (MLCB) proceeding, **PMLR** as an oral (top 10%) presentation.
- **Paper** *Visualizing DNA Reaction Trajectories with Deep Graph Embedding Approaches* was accepted to Machine Learning for Structural Biology (MLSB) Workshop at **NeurIPS 2022** as a poster presentation.
- Proposed a novel approach known as ViDa that integrates deep graph embeddings and variational autoencoder (VAE) constrained by biophysics-informed losses, to visualize DNA reaction state space and folding trajectory space to understand DNA reaction mechanisms. Open the sourced **code** for the ViDa model on GitHub.

Research Assistant | Supervisor: Prof. Pavle Radovanovic — Jun. 2020 – Feb. 2021
University of Waterloo — *Waterloo, ON, Canada*

- **Paper** *Revisiting Plasmonic Properties of Complex Semiconductor Nanocrystals Using Magnetic Circular Dichroism Spectroscopy: A Cautionary Tale* was accepted to **The Journal of Physical Chemistry Part C**.
- Underlined the challenges in assigning absorption bands of complex semiconductor nanocrystals to the localized surface plasmon resonance. Demonstrated the magnetic circular dichroism spectroscopy as an invaluable tool for characterization of these materials.

Research Assistant | Supervisor: Prof. Pavle Radovanovic — Jul. 2019 – Aug. 2020
University of Waterloo — *Waterloo, ON, Canada*

- **Paper** *On the Origin of d^0 Magnetism in Transparent Metal Oxide Nanocrystals* was accepted to **The Journal of Physical Chemistry Part C**.
- Reported a variable-temperature–variable-field magnetic circular dichroism study of ZnO and SnO_2 nanocrystals prepared under oxidizing and reducing conditions. Demonstrated the ability to tune carrier polarization in metal oxide nanocrystals by in situ control of the native defect formation and attest to the anomalous Zeeman splitting of the band states.

Research Assistant | Supervisor: Prof. Pavle Radovanovic — Sept. 2018 – Jun. 2019
University of Waterloo — *Waterloo, ON, Canada*

- **Paper** *Manipulating Carrier Polarization in Semiconductor Nanocrystals* was accepted to **ECS Transactions** of The Electrochemical Society.

- Investigated the role of the synthesis method and post-synthesis processing on the plasmonic properties of antimony-doped SnO_2 nanocrystals. Designed semiconductor nanocrystals with targeted plasmonic properties by proposed synthesis methodology and post-synthesis treatment.

Undergraduate Research Assistant | **Supervisor: Prof. Pu Chen** Dec. 2017 – Aug. 2018
University of Waterloo *Waterloo, ON, Canada*

- **Report** *Aqueous Rechargeable Zinc-Ion Battery Using Vanadium Pentoxide Intercalation Cathode*.
- Proposed a novel approach to improve the charge/discharge performance of aqueous rechargeable batteries that use zinc ions as electrolyte and vanadium oxide as cathode.

Undergraduate Research Intern | **Supervisor: Prof. Yuliang Zhao** Jun. 2016 – Aug. 2017
National Center for Nanoscience and Technology *Beijing, China*

- Applied *China Academy of Sciences Students' Innovative Practice Training Program 2017* as a project leader and conducted a one-year project on cancer treatment via nanomedicine, and awarded the research intern scholarship.
- Constructed drug-loaded nanoparticles and improved the targeting ability of docetaxel to a certain extent.

Work Experience

Mitacs Scholar | **Supervisor: Dr. James Chen** From Jun. 2023
Amgen *Burnaby, BC, Canada*

- Internship at Amgen as a role of machine learning research scientist.
- Protein structure modelling and cryo-EM analysis with machine learning approaches.

Teaching Experience

Teaching Assistant Sept. 2021 – Apr. 2023
University of British Columbia *Vancouver, BC, Canada*

- ***CPSC 340/532M***: Machine Learning and Data Mining
- ***CPSC 330***: Applied Machine Learning
- ***CPSC 322***: Introduction to Artificial Intelligence

Teaching Assistant Sept. 2018 – Dec. 2020
University of Waterloo *Waterloo, ON, Canada*

- ***CHE 102***: Chemistry for Engineers
- ***CHEM 120L***: General Chemistry Laboratory I
- ***CHEM 123L***: General Chemistry Laboratory II

Publications

Synthetic High-resolution Cryo-EM Density Maps with Generative Adversarial Networks Jul. 2024
Submitted **Download**

- *Chenwei Zhang, Anne Condon, Khanh Dao Duc*

A comprehensive survey and benchmark of deep learning-based methods for atomic model building from cryo-EM density maps Jul. 2024
Submitted **Download**

- *Chenwei Zhang, James Chen, Anne Condon, Khanh Dao Duc*

ViDa: Visualizing DNA hybridization trajectories with biophysics-informed deep graph embeddings Nov. 2023
Machine Learning in Computational Biology (oral). PMLR 240:148-162, 2024 **Download**

- *Chenwei Zhang, Jordan Lovrod, Boyan Beronov, Khanh Dao Duc, Anne Condon*

EMPOT: partial alignment of density maps and atomic model fitting using unbalanced Gromov-Wasserstein divergence Oct. 2023
Conference Workshop Paper accepted at NeurIPS 2022 **Download**

- *Aryan Tajmir Riahi, Chenwei Zhang, James Chen, Anne Condon, Khanh Dao Duc*

Revisiting Hybridization Kinetics with Improved Elementary Step Simulation Aug. 2023
Journal Paper accepted to DNA29 **Download**

- *Jordan Lovrod, Boyan Beronov, Chenwei Zhang, Erik Winfree, Anne Condon*

Revisiting Plasmonic Properties of Complex Semiconductor Nanocrystals Using Magnetic Circular Dichroism Spectroscopy: A Cautionary Tale Jan. 2023
Journal Paper accepted to J. Phys. Chem. C **Download**
- *Aaron Kenny-Wilby, Gyorgy Jaics, Chenwei Zhang, Penghui Yin, Pavle V. Radovanovic*

Visualizing DNA Reaction Trajectories with Deep Graph Embedding Approaches Oct. 2022
Conference Workshop Paper accepted at NeurIPS 2022 **Download**
- *Chenwei Zhang, Khanh Dao Duc, Anne Condon*

On the Origin of d^0 Magnetism in Transparent Metal Oxide Nanocrystals Dec. 2021
Journal Paper accepted to J. Phys. Chem. C **Download**
- *Chenwei Zhang, Penghui Yin, Wenhuan Lu, Victor Galievsky, Pavle V. Radovanovic*

Manipulating Carrier Polarization in Pure and Doped Metal Oxide Semiconductor Nanocrystals Feb. 2021
M.Sc. Thesis at UWaterloo **Download**
- *Chenwei Zhang*

Manipulating Plasmonic Properties of Sb-Doped SnO_2 Nanocrystals by Controlling Dopant Oxidation State via Synthesis Method and Processing Conditions Sept. 2020
Conference Paper accepted to ECS Trans. **Download**
- *Chenwei Zhang, Penghui Yin, Pavle V. Radovanovic*

Personal/School Projects

VideoCLIP-based Evaluation Metrics for Text-to-Video Generative Tasks Sept. 2022 – Dec. 2022
University of British Columbia *Vancouver, BC, Canada*
- Proposed a VideoCLIP-based evaluation metric for text-to-video generators, dubbed **VCLIP-Metric**, to capture the sequential information in the video and compare its semantic information with the input text. Our results show that the final score is almost twice the existing CLIP frame-based metric.
- View the **report**. Open the sourced **code** for the VCLIP-Metric model on GitHub.

i-ViDa: Visualizing Energy Landscapes and Trajectories of DNA Reactions Sept. 2022 – Dec. 2022
University of British Columbia *Vancouver, BC, Canada*
- Designed a user-friendly interactive visualization tool, **i-ViDa**, in the shape of a website by using D3.js, which allows users to plot latent space produced by ViDa, and then manipulate the visualization of energy landscapes and trajectories of interest.
- View the **report**. Open the sourced **code** for the i-ViDa model on GitHub.

Approximating and visualizing path spaces in large CTMCs Mar. 2022 – Apr. 2022
University of British Columbia *Vancouver, BC, Canada*
- Implemented a version of the Pathway Elaboration algorithm in Julia that can be used for arbitrary CTMCs where the rate matrices are represented explicitly and used Julia's plotting packages to curate tools that meaningfully illustrate the state distributions and trajectory samples in large CTMCs.
- View the **report**. The sourced **code** will be released on GitHub soon.

VASLA: Visually Assisted Sound-Localization and Amplification Nov. 2021 – Dec. 2021
University of British Columbia *Vancouver, BC, Canada*
- Developed **VASLA**, a tool to help alleviate machines' difficulty in separating sounds of interest from background sounds in noisy environments.
- View the **report**. Open the sourced **code** for the VASLA model on GitHub.

Quantum Valley Investments Problem Pitch Competition May 2020 – Jul. 2020
University of Waterloo *Waterloo, ON, Canada*
- Competed in a pitch competition, which awards winners funding for conducting research and founding a startup, to conquer challenges of training data quality problems in AI, especially in the healthcare AI market.

Kaggle Competitions – COVID-19 Study Mar. 2020 – Apr. 2020
University of Waterloo *Waterloo, ON, Canada*
- Won the **bronze** medal for the COVID-19 competition.

Activities

- Dec. 2023: ***Poster presentation*** at Machine Learning in Structural Biology at NeurIPS 2023, New Orleans, USA.
- Dec. 2023: ***Oral presentation*** at Machine Learning in Computational Biology Conference (MLCB2023), University of Washington, Seattle, USA.
- Sept. 2023: ***Poster presentation*** at 29th International Conference on DNA Computing and Molecular Programming (DNA29), Tohoku University, Sendai, Japan.
- Sept. 2023: ***15-minute talk*** at Workshop - Mathematical Methods for Exploring and Analyzing Morphological Shapes across Biological Scales, BIRS, Banff, Canada.
- Dec. 2022: ***Poster presentation*** at Machine Learning in Structural Biology at NeurIPS 2022, New Orleans, USA.
- Aug. 2022: ***Poster presentation*** as coauthor at 28th International Conference on DNA Computing and Molecular Programming (DNA28), University of New Mexico, Albuquerque, USA.
- Spring 2018: ***Mentor*** of junior undergraduate students from 2+2 program at UWaterloo.
- Winter 2017, Spring 2018: ***Member*** of International Peer Community & Conversation Partner Program at UWaterloo.
- Winter 2018: ***Member*** of UW Photo Club, skilled at digital SLR camera photography, photo editing and video clipping.
- Jul. 2016 – Aug. 2016: ***Volunteer*** in the "Explore China" project held by AIESEC in Beijing.
- Winter 2015: ***Head*** of the Enrollment Association Shanxi Province Group at BJTU.

Honours, Awards, Grants and Scholarships

- Jun. 2023 – Jun. 2024: ***Mitacs Accelerate Fellowship***, Amgen Canada & University of British Columbia
- From Sept. 2021: ***International Tuition Award, Faculty of Science PhD Tuition Award, President's Academic Excellence Initiative PhD Award, Research Assistant Scholarship***, University of British Columbia
- Sept. 2018 – Feb. 2021: ***International Master's Student Award (IMSA), Science Graduate Award (SGA), Research Graduate Scholarship***, University of Waterloo
- Sept. 2018 – Feb. 2021: ***International Master's Student Award (IMSA), Science Graduate Award (SGA), Research Graduate Scholarship***, University of Waterloo
- May 2018, Sept. 2018: ***Dean's Honours List***, University of Waterloo
- 2017 – 2018: ***International Tuition Grant***, University of Waterloo
- Oct. 2016, Oct. 2017, Oct. 2018: ***Academic Scholarships (Top 5%)***, Beijing Jiaotong University
- Nov. 2017: ***Scholarship of Student's Innovation***, Chinese Academy of Science

Skills

- ***Languages***: English, Mandarin
- ***Programming Languages***: Python, Julia, MATLAB, C/C++, HTML, Markdown, Bash, CSS, LaTeX
- ***Frameworks***: PyTorch, Scikit-learn, TensorFlow, Keras
- ***Developer Tools***: AWS EC2/S3, Nvidia DGX, Git, Docker, Apptainer(Singularity), VS Code, PyCharm, Unix and Unix-based servers, Cuda
- ***Libraries***: NumPy, SciPy, Pandas, Matplotlib, Plotly, networkx