CHENWEI ZHANG

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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. Open-sourced on **Github**
- Developed generative models including GANs and diffusion models to solve biological problems, such as protein structure modeling.

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.
- Developed ViDa, a deep graph embedding and VAE-based model with biophysics-informed constraints to visualize DNA reactions. Open-sourced 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**.
- Identified challenges in absorption band assignment and showcased magnetic circular dichroism spectroscopy for characterization.

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**.
- Conducted a magnetic circular dichroism study on metal oxide semiconductors, demonstrating tunable carrier polarization and anomalous Zeeman splitting.

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.
- Studied synthesis and processing effects on plasmonic properties of metal oxide semiconductor nanocrystals.

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*.

- Developed a novel method to enhance charge/discharge performance in zinc-ion aqueous rechargeable batteries with a vanadium oxide cathode.

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

- Led a one-year project on nanomedicine for cancer treatment, developing drug-loaded nanoparticles to enhance docetaxel targeting; awarded a research intern scholarship.

Work Experience

Machine Learning Intern | **Manager: Dr. Siavash Khallaghi** From Jan. 2025
Prenuvo *Vancouver, BC, Canada*

- Building vision-language foundation model for medical image (MRI) analysis.

Machine Learning Intern | **Manager: Dr. James Chen** Jun. 2023 – Jun. 2024
Amgen *Burnaby, BC, Canada*

- Developed deep learning approaches for protein structure modeling and cryo-EM 3D image analysis.

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 VCLIP-Metric, a VideoCLIP-based metric for text-to-video generators, achieving a score nearly twice that of CLIP frame-based metrics. View the **report**. Open-sourced on **Github**.

i-ViDa: Visualizing Energy Landscapes and Trajectories of DNA Reactions Sept. 2022 – Dec. 2022
University of British Columbia *Vancouver, BC, Canada*
- Designed i-ViDa, an interactive visualization tool using D3.js, enabling users to plot and manipulate latent space, energy landscapes, and trajectories. View the **report**. Open-sourced on **Github**.

Approximating and visualizing path spaces in large CTMCs Mar. 2022 – Apr. 2022
University of British Columbia *Vancouver, BC, Canada*
- Implemented Pathway Elaboration algorithm in Julia for arbitrary CTMCs with explicit rate matrices, using Julia's plotting packages to visualize state distributions and trajectory samples in large CTMCs. View the **report**

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-sourced on **GitHub**.

Quantum Valley Investments Problem Pitch Competition May 2020 – Jul. 2020
University of Waterloo *Waterloo, ON, Canada*
- Competed in a pitch competition for funding to address training data quality challenges in AI, focusing on 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

- Sept. 2024: ***Poster presentation*** at 30th International Conference on DNA Computing and Molecular Programming (DNA30), Johns Hopkins University, Baltimore, USA.
- Dec. 2023: ***Poster presentation*** at Machine Learning in Structural Biology (MLSB2023) at NeurIPS 2023, New Orleans, USA.
- Dec. 2023: ***Oral presentation*** at 18th 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 (MLSB2022) 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
- 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, Llama
- ***Developer Tools***: AWS EC2/S3, Nvidia DGX, Git, Docker, Apptainer(Singularity), Unix and Unix-based servers, CUDA, VS Code, PyCharm,
- ***Libraries***: NumPy, SciPy, Pandas, Matplotlib, Plotly, NetworkX