

MARY JIALU CHEN

PhD Candidate | ETH Zurich

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EDUCATION

Zurich, CH

Sep 2020 - Present

ETH Zurich

Doctoral Candidate in Mechanical and Process Engineering

Waterloo, CA

May 2019 - Apr 2020

University of Waterloo

MASc in Chemical Engineering (Nanotechnology)

Waterloo, CA

Sep 2014 - Apr 2019

University of Waterloo

BASc in Chemical Engineering (Nanotechnology)

RESEARCH EXPERIENCE

ETH ZURICH

*Composite Materials
and Adaptive
Structures Laboratory*
Sep 2020 - Present

Doctoral Student

- Investigating bulk and surface modifications of polymeric biomaterials for optimization of hemocompatibility as well as mechanical performance
- Developing manufacturing processes for a novel, low-cost, all-polymeric transcatheter heart valve
- Implemented in vitro and in vivo testing protocol for cardiovascular material assessment
- Collaborating with groups at University of Zurich, University Hospital Zurich, and German Heart Center Berlin

UNIVERSITY OF WATERLOO

*2D Materials and
Electrochemical
Devices Laboratory*
Jan 2018 - Apr 2020

Master's Student & Research Assistant

- Performed first ever quantum capacitance measurements in monolayer molybdenum disulfide (MoS₂) and MoS₂-graphene electrode systems
- Investigated effect of nanosheet restacking and charging mechanisms in molybdenum disulfide supercapacitor materials
- Optimized nanosheet synthesis methods for consistent monolayer nanosheet film formation
- Defect engineered nanosheets to maximize intrinsic capacitance of MoS₂ using sulfur vacancies, oxygen defects, and size effects

ETH ZURICH

*Composite Materials
and Adaptive
Structures Laboratory*
Sep 2016 - Apr 2017

Research Intern

- Studied rheological changes caused by incorporating nanoparticles into a polymer melt and the resulting effect on its processing speed for sustainable composite material fabrication
- Optimized nanofilling process to induce a 50% viscosity reduction in the polymer and a two-fold increase in processing speed
- Explored nanofilling effect on coating fluid dynamics and co-authored manuscript
- Characterized material properties and composite structure using rheometry, SEM, and MATLAB

UNIVERSITY OF CALGARY

Egberts Nanotribology Group, Karan Group, Trifkovic Research Group
Jan 2016 - Apr 2016

Research Engineer

- Conducted parameter study on the fabrication of graphene through chemical vapour deposition
- Established standard protocols and written documentation for production of monolayer graphene from synthesis to film transfer
- Investigated and modelled fictional behaviour using MATLAB
- Characterized samples using Raman spectroscopy and AFM

UNIVERSITY OF WATERLOO

Laboratory for Sustainable Nanomaterials and Functional Colloids
May 2015 - Jan 2016

Undergraduate Researcher

- Designed high performance metal nanocatalysts and supercapacitor materials using sustainable cellulose nanocrystals as a substrate
- Achieved nanoparticle sizes of 1-2 nm through aqueous synthesis
- Co-authored article detailing an organic reduction reaction rate triple that of comparable catalysts
- Performed characterization using TEM, UV-Vis, and impedance spectroscopy

TEACHING EXPERIENCE

ETH Zurich

Feb 2021 - Present

Thesis Supervisor & Teaching Assistant

- Supervised the completion of one Bachelor and one Master Thesis
- Organized training, defined projects, and held weekly meetings
- Taught the Manufacturing of Polymer Composites Laboratory
- Conducted lab introduction sessions, prepared pre-lab exercises, and organized laboratory experiments for 32 graduate students

University of Waterloo

May 2019 - Apr 2020

Teaching Assistant

- Taught ECE 209: Electronic and Electrical Properties of Materials and NE 125: Introduction of Materials Science and Engineering
- Prepared problem sets and explained material science concepts for weekly tutorials for classes of 100 undergraduate students as well as marking duties

OTHER EXPERIENCE

AV-MAVT

Jan 2022 - Present

Board Member

- Representing scientific staff in the Department of Mechanical and Process Engineering at ETH Zurich during departmental conferences
- Organizing networking events for PhD students and postdocs
- Fostering collaborations with other departments.

Waterloo Nanotechnology Conference

May 2018 - Apr 2020

Logistics Director & Advisor

- Organized annual, interdisciplinary conference, that showcases all walks of nano research, featuring notable speakers such as Eli Yablonovitch and Vladimir Bulovic
- Secured funding, handled finances and arranged bookings for 250 delegates, including undergraduate students, graduate students, and members of industry
- Mentored younger students on conference organization

JOURNAL ARTICLES

1. **Chen, M.J.**, Pappas, G., Massella, D., Schlothauer, A., Motta, S., Cesarovic, N., Falk, V., and Ermanni, P. (2022) Tailoring PEEK Crystallinity for Hemocompatible and Durable Cardiovascular Devices. Submitted.
2. **Chen, J.**, Walker, W.R., Xu, L., Krysiak, O., She, Z., and Pope, M.A. (2020) Intrinsic Capacitance of Molybdenum Disulfide. *ACS Nano*. 14: 5636–5648.
3. Wu, X., Shi, Z., Fu, S., **Chen, J.**, Berry, R.M., and Tam, M.K.C. (2016) Strategy for Synthesizing Porous Cellulose Nanocrystal Supported Metal Nanocatalysts. *ACS Sustainable Chemistry & Engineering*. 4: 5929–5935.

SELECTED POSTERS AND PRESENTATIONS

1. **Chen, M.J.**, Schlothauer, A., Pappas, G., Cesarovic, N., Falk, V., and Ermanni, P. (2021) Thin Polymeric Materials and Processing Routes for Novel Biomedical Implants. International Poster Presentation, NanoBioTech Montreux 2021.
2. **Chen, J.** (2020) Intrinsic Capacitance, Charge Storage Mechanisms, and Defect Engineering of Molybdenum Disulfide Nanosheets. Institutional Oral Presentation, University of Waterloo Nanotechnology MASc Seminar.
3. **Chen, J.**, Walker, W.R., Xu, L., Krysiak, O., She, Z., and Pope, M.A. (2019) Intrinsic Capacitance, Charge Storage Mechanisms, and Defect Engineering of Molybdenum Disulfide Nanosheets. Institutional Poster Presentation, 2019 Waterloo Institute of Nanotechnology Research Symposium.
4. **Chen, J.**, Kaniselvan, M., Seeleman, C., and Smith, D. (2019) A Real-Time Non-Invasive Sensor for Monitoring Laser-Induced Temperature in Medical Applications. Institutional Poster Presentation, 2019 Nanotechnology Engineering Capstone Design Symposium.
5. **Chen, J.**, Walker, W.R., Xu, L., and Pope, M.A. (2018) Structure-dependent Double-layer Charging Mechanisms Probed Using Graphene and Molybdenum Disulfide Monolayer Electrodes. International Oral Presentation, 68th Canadian Chemical Engineering Conference.

TECHNICAL SKILLS

Characterization	AFM, DLS, CV, EIS, Raman, Rheometry, SEM, TEM, TGA, UV-Vis
Fabrication	CVD, Film Transfer, Photolithography, RIE, Sputtering
Programming	MATLAB, Python
Modelling	COMSOL, SolidWorks
Languages	English (native), Mandarin (native), French (B1), German (B1)

AWARDS AND SCHOLARSHIPS

2022	ISMICS Subramanian Innovation Award Finalist, \$1 800
2019-2020	University of Waterloo Graduate Research Studentship, \$35 000
2019	Ontario Graduate Scholarship, \$15 000
2019	University of Waterloo President's Graduate Scholarship, \$5 000
2019	Waterloo Institute for Nanotechnology Nanofellowship, \$10 000
2019	Nanotechnology Engineering Design Symposium Award, \$1 000
2019	Engineering Dean's Entrance Award, \$5 000
2018	Dean's Accelerated Master's Award, \$4 500
2016	David Johnston International Experience Award, \$2 500
2015-2018	NSERC Undergraduate Student Research Award (3x), \$18 000
2014	Gamma Dynacare Scholarship Award, \$1 500
2014-2018	Don Walker Scholarship, \$12 000
2014	University of Waterloo President's Scholarship, \$2 000