

# 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 Nanotechnology Engineering

## 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 (MoS<sub>2</sub>) and MoS<sub>2</sub>-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 MoS<sub>2</sub> 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

## OTHER EXPERIENCE

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**Telejob**  
Oct 2022 - Present

**Vice President**

- Connecting scientific staff at ETH Zurich with industrial, academic, and governmental partners
- Managing networking events with over 1000 attendees
- Contributing towards organizational policy and working groups
- Fostering collaborations with other associations

**Science & Policy  
Exchange**  
May 2022 - Present

**VP Marketing**

- Managing the online presence of Science & Policy Exchange on Twitter, LinkedIn, Facebook, and Instagram accounts
- Drafting material for events, news, and other relevant information
- Designing graphics for science advocacy campaigns
- Moderating group discussions at science policy events

**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

**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
- Reviewed conference submissions and mentored younger board members

## SELECTED 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. In review.
2. **Chen, M.J.** (2022) Topping the Ivory Tower: Increasing Public Participation and Trust in Research. Journal of Science Policy & Governance. Journal of Science Policy & Governance. 21 (2)
3. **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.
4. 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.**, Pappas, G., Massella, D., Schlothauer, A., Motta, S., Falk, V., Cesarovic, N., and Ermanni, P. (2022) Tailoring PEEK Crystallinity: Key for Hemocompatible and Durable Cardiovascular Implants. International Oral Presentation, International Society for Minimally Invasive Cardiothoracic Surgery 2022 Annual Meeting.
2. **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.
3. **Chen, J.** (2020) Intrinsic Capacitance, Charge Storage Mechanisms, and Defect Engineering of Molybdenum Disulfide Nanosheets. Institutional Oral Presentation, University of Waterloo Nanotechnology MASc Seminar.
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

|                         |   |
|-------------------------|---|
| <b>Characterization</b> | AFM, DLS, CV, EIS, Raman, Rheometry, SEM, TEM, TGA, UV-Vis    |
| <b>Fabrication</b>      | CVD, Film Transfer, Photolithography, RIE, Sputtering         |
| <b>Programming</b>      | MATLAB, Python  |
| <b>Modelling</b>        | COMSOL, SolidWorks  |
| <b>Languages</b>        | English (native), Mandarin (native), French (B2), German (B1) |

## AWARDS AND SCHOLARSHIPS

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