MARY JIALU CHEN

Doctoral Candidate | ETH Zurich

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EDUCATION

Zurich, Switzerland
Sep 2020 – Present

ETH Zurich
Doctoral Candidate in Mechanical and Process Engineering

Waterloo, Canada
May 2019 – April 2020

University of Waterloo
M.A.Sc. in Chemical Engineering (Nanotechnology)

Waterloo, Canada
Sep 2014 – April 2019

University of Waterloo
B.A.Sc. in Nanotechnology Engineering with Distinction

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 and mechanical performance
- Developing manufacturing processes for a novel, low-cost, all-polymeric transcatheter heart valve
- Collaborating with groups at University of Zurich and German Heart Center Berlin

University of Waterloo
2D Materials and Electrochemical Devices Laboratory
Jan 2018 – Apr 2020

MASC STUDENT AND RESEARCH ASSISTANT

- Performed first ever quantum capacitance measurements in monolayer molybdenum disulfide (MoS_2) and MoS_2-graphene electrodes
- Investigated effect of nanosheet restacking and charging mechanisms in molybdenum disulfide supercapacitor materials
- Optimized nanosheet synthesis methods for consistent monolayer film formation
- Defect engineered nanosheets to maximize intrinsic capacitance of MoS_2 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 consequently, 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 hexagonal, monolayer graphene from synthesis to film transfer
- Investigated and modelled fictional behaviour of graphene using MATLAB
- Characterized graphene 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 redox reactions
- Co-authored article detailing an organic reduction reaction rate triple that of comparable catalysts
- Performed characterization using TEM, UV-Vis, and impedance spectroscopy

OTHER WORK EXPERIENCE

ETH Zurich
Feb 2021 – Present

THESIS SUPERVISOR

- Supervised the completion of one Bachelor and one Master Thesis
- Organized training, defined projects, and held weekly meetings

ETH Zurich
Feb 2021 – Present

TEACHING ASSISTANT

- Taught the Manufacturing of Polymer Composites Laboratory
- Conducted lab introduction sessions, prepared pre/post-lab exercises, and organized laboratory experiments

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

Waterloo Nanotechnology Conference
May 2018 – Present

LOGISTICS DIRECTOR

- 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

University of Waterloo NanoRobotics Group
Oct 2014 – Apr 2017

STUDENT ENGINEER

- Designed and prototyped liquid microrobots for an internationally renowned undergraduate student team that competes at the International Conference for Robots and Automation (ICRA)
- Fabricated hydrophobic surfaces for a fluids-based microrobot

JOURNAL ARTICLES

1. **Chen, M.J.**, Pappas, G., Massella, D., Schlothauer, A., Motta, S., Cesarovic, N., Falk, V., and Ermanni, P. (2021) Tailoring PEEK Crystallinity: Key for Highly Hemocompatible and Mechanically Performing Cardiovascular Implants. In prep.
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

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