a) NAME

Ren, Carolyn L.

Professor, tenured
Member of the Graduate faculty

b) DEGREES

Ph.D., University of Toronto, Mechanical Engineering, 2004
M.Sc., Harbin Institute of Technology, China, Thermal Engineering, 1995
B.Sc., Harbin Institute of Technology, Thermal Engineering, 1992

c) EMPLOYMENT HISTORY

2022-2029: Tier 1 Canada Research Chair in Microfluidic Technology
20015-present: Mechanical & Mechatronics Engineering, University of Waterloo
2021-2025: cross-appointed to Department of Chemical Engineering, UW
2021-2024: cross-appointed to Department of Optometry, UW
2020-2024: cross-appointed to Department of Electrical and Computer Engineering & Systems Design Engineering, UW
2020-2024: Visiting Professor, Brigham and Women Hospital, Department of Medicine, Harvard University
2020: Co-founder of ALPHAXON, Air Microfluidic Systems Inc.
2019-2023: cross-appointed to the Department of Kinesiology, UW
2016: Co-founder of QauntWave Technology Ltd.
2014-2019: Tier 2 Canada Research Chair in Droplet Microfluidics and Lab-on-a-Chip Technology
2014-2015: Visiting Professor, École Supérieure of Industrial Physics and Chemistry of the City of Paris (ESPCI ParisTech)
2010-2015: Associate Professor, Mechanical & Mechatronics E20ngineering, University of Waterloo
2010: Co-founder of Advanced Electrophoresis Solutions Ltd.
2009-2015: cross-appointed to Department of Biology, UW
2009-2014: Tier 2 Canada Research Chair in Lab-on-a-Chip Technology
2005-2024: cross-appointed to the Department of Chemistry, UW
2004-2010: Assistant Professor, Mechanical & Mechatronics E20ngineering, University of Waterloo
2003: Visiting Scientist, Computer and Electrical Engineering, University of Alberta
1995-1999: Lecturer, Power Engineering, Dalian University of Technology, China

d) HONOURS

Fellow, Canadian Academy of Engineering, 2023
Canada's Most Powerful Women: Top 100 Award, 2021
Award of Excellence in Graduate Supervision, University of Waterloo, 2021
Fellow, Canadian Society of Mechanical Engineering, 2012

e) SCHOLARLY AND PROFESSIONAL ACTIVITIES

Editorial

Co-editor, Special issue of Microfluidic, Nanofluidics and Lab-on-a-Chip Technology for Electrophoresis, Wiley Online Library, 2021-2022.

Guest editor, Special issue on Soft Robotics for Biomicrofluidics, AIP, 2019-present.

Co-editor, Book titled Droplet Microfluidics, Royal Society of Chemistry, 2019-2020.

Guest editor of Journal of Microfluidics and Nanofluidics, 2016-2017

Section editor and section editor of the 2nd edition of the Encyclopedia of Microfluidics and Nanofluidics, 2012-2014

Conference organization

Oct 2022-Oct 2023, Organizer for the Workshop on "Detection Systems in LOC/Biosensors/Sensors", MicroTAS, Plac Sławika i Antalla 140-163 Katowice, Poland., Oct 15-19, 2023.

Oct 2020-Jul 2021, Conference co-Chair for Microfluidics and Lab-on-a-Chip Technology, Shenzhen, China, Jul 2-4, 2021 (online and in-person hybrid).

May 2017-Jun. 2018, Conference co-Chair for Microfluidics and Lab-on-a-Chip Technology, Beijing, China.

Jul 2015 - Jun. 2016, Conference Co-Chair for Microfluidics and Lab-on-a-Chip Technology, Dalian, Liaoning, China.

Nov 2014-Nov2015, Symposium co-Chair, for Wetting and Soft Electrokinetics, Materials Research Society, November 29-December 4, 2015, Boston, MA, USA.

Jul 2014 - Jun. 2015, Panel organizer and Track co-Chair, for Microfluidics and Lab-on-a-Chip Technology for ASME 2015 13th International Conference on Nanochannels, Microchannels and Minichannels (ICNMM15), San Francisco, USA.

Sept. 2013 - Aug. 2014, Track Co-Chair of ASME 2014 12th International Conference on Nanochannels, Microchannels and Minichannels (ICNMM14), Chicago, USA.

Jul 2012 - Jun. 2013, Track Co-Chair of ASME 2013 11th International Conference on Nanochannels, Microchannels and Minichannels (ICNMM13), Sapporo, Japan.

Aug 2011- Jul. 2012, Track Chair of ASME 2012 10th International Conference on Nanochannels, Microchannels and Minichannels (ICNMM12), Puerto Rico, USA.

Apr 2011- Mar. 2012, Track Co-chair of ASME 3rd Micro/Nanoscale Heat and Mass Transfer International Conference (MNHMT12), Georgia, Atlanta, USA.

Jan 2010-Dec. 2010, Scientific committee and Track Co-chair of 2nd European Conference on Microfluidics, Toulouse, France.

Jan 2009 - Dec. 2009, Track Co-chair of ASME 2nd Micro/Nanoscale Heat and Mass Transfer International Conference (MNHMT09), Shanghai, China.

f) GRADUATE SUPERVISIONS

Completed: 0 P.D.F., 11 Ph.D., 26 M.A.Sc.

In progress: 2 P.D.F., 4 Ph.D., 6 M.A.Sc.

NAME OF STUDENTS supervised (past seven years)

1. Jun Li, P.D.F., Microfluidic System for Detection of COVID using Microwave, 2023-present
2. Cameron Sjaarda, M.A.Sc., Development of Soft Robotic Hand for Lymphedema Treatment, 2023-present
3. Nick Levinski, M.A.Sc., Development of Flexible Sensors for Soft Robotic Systems, 2023-present
4. Oscar Manuel, M.A.Sc., Development of a Microfluidic Platform for Protein Fractionation, 2023-present
5. Vivian Mai, Ph.D., Development of a Microfluidics Enabled Lymphedema Sleeve, 2023-present
6. Nikhil Giri, Ph.D., Development of a Microwave Sensor for Drainage Fluid for Post-Operative Monitoring, 2022-present
7. Dylan Hahn, M.A.Sc., Development of Active Control of Droplet towards Modular Platform, 2022-present
8. Jordan Savage, M.A.Sc., Development of Microfluidics Enabled Soft Robotic Posture Correction System, 2022-present
9. Noura Ezzo, M.A.Sc., Development of Droplet Microfluidics Platform for Hydrogel Material Synthesis towards Organoids, 2022-present
10. Weijia Cui, P.D.F., Microfluidic System for Detection of COVID using Microwave, 2021-present
11. Seyyed Shafiei Darabi, Ph.D., Development of a Microwave Sensor for Water Quality Control, 2021-present
12. Vivian Mai, M.A.Sc., Development of Fully Automated Modular Systems for Lymphedema Sleeve, 2021-2023
13. Nikhil Giri, M.A.Sc., Development of Droplet Microfluidic Platform for Material Synthesis, 2021-2022
14. Yiqi Zhang, Ph.D., Development of Pressure Measurement Methods for Air Microfluidic Systems, 2020-present
15. Kevin Chen, M.A.Sc., Development of Fully Automated Modular Systems for Droplet Microfluidics, 2020-2023
16. Peter Lee, M.A.Sc., Development of Control Strategies for Soft Wearable Robotic, 2020-2023
17. Wasim Kapadia, M.A.Sc., Development of a Microfluidic Viscometer for Tear Films, 2020-2022
18. Paula He, M.A.Sc., Development of a model for Braced and Unbraced Knees, 2019-2022
19. Anson Lau, M.A.Sc., Microwave Enabled Chemical Reaction using Droplet Microfluidics, 2019-2022
20. Tomasz Zablotny, M.A.Sc., Active Control with Microwave Sensing Feedback, 2019-2021
21. Runze Gao, Ph.D., Miniaturization of Soft Robotic Control Systems and Actuators for Biomedical Applications, 2018-2023
22. Victoria Kerr, M.A.Sc., Development of Multilayer Nanoparticles, 2018-2020

23. Jeff Farness, Development of Microfluidic Devices with Check Valves for Protein Fractionation, 2018-2020
24. Sepehr Ghadami, M.A.Sc., Development of a Microfluidic System Enabling Manufacture of Polymersomes for Detection of Metal Contamination in Water, 2018-2019
25. Matthew Courtney, Ph.D., Developing of Microwave Integrated Microfluidic Platform for DNA Sensing, 2017-2022
26. Marie Hebert, Ph.D., Developing of Control Software and Systems for Droplet Manipulation, 2017-2020
27. Shinong Mao, M.A.Sc., Development of Microfluidic Devices Integrated with Microwave Sensing for Water Quality Control, 2017-2018
28. Weijia Cui, Ph.D., Development of Microwave Sensing and Heating Methods for Droplet Microfluidics, 2016-2020
29. Merve Marcali, 2016-2020, Development of Microfluidic Platform for Vaccine Discovery, 2016-2020
30. Thu Nguyen, Ph.D., Development of Droplet Microfluidic Devices for Nanoparticle Synthesis, 2016-2019
31. Lauren LeSergent, M.A.Sc., Developing of Multilayer Nanoparticles for Drug Delivery, 2016-2018
32. Marie Hebert. M.A.Sc., Developing of Control Software and Systems for Droplet Manipulation, 2016-2017
33. Pegah Pezeshkpour, Ph.D., Numerical Modelling of Microfluidic Transport Phenomena for Electrophoresis Separation, 2013-2018
34. Gürkan Yeşilöz, Ph.D., Development of Microwave Sensor/heater for Droplet-based Microfluidics, 2013-2017
35. Ning Qin, Ph.D., Development of Droplet-based Microfluidic Platform for Protein Analysis, 2012-2017

g) GRADUATE COURSES (past seven years)

Microfluidics, MEMS and Lab on a Chip, 2021

h) RESEARCH FUNDING (past seven years as principal investigator)

External

2023-2024, UW's Free-Flow Counterflow Gradient Focusing Technology - Enabling Protein Purification with High Resolution and High Throughput, NSERC-I2I, $125,000

2023-2024, Microfluidic Viscometer Technology - Enabling the Measurement of the Viscosity of Microliter-Volume Liquids, NSERC-I2I, $113,500

2022-2029, Droplet Microfluidics and Microfluidics Enabled Soft Robotic Wearables, CRC, $1,400,000

2022-2029, Droplet Microfluidics and Microfluidics Enabled Soft Robotic Wearables, Institutional match for CRC, $350,000

2022-2029, Droplet Microfluidics and Microfluidics Enabled Soft Robotic Wearables, CFI, $100,000
2022-2023, Rapid detection of E. coli in water systems using microfluidic microwave sensor functionalized with nano-biomaterials, WIN and WI Seed Funding, $25,000
2022-2024, A Microfluidic Biosensor for Monitoring Post-Operative Drainage Fluid, Mitacs – Accelerate, $180,000
2021-2022, A Novel Air Microfluidics Technology – Enabling Active Compression Apparels for Treating Lymphedema, Edema and Muscle Recovery for Strenuous Work and Exercise, NSERC I2I, $125,000
2021-2022, Development of a Microwave Enabled Bio-Nano-Microfluidic Device for Point-of-Care Diagnosis of COVID-19, CIHR SARS-CoV-2 variants supplement, $50,000
2020-2026, Additive Manufacturing in Engineering Design and Global Entrepreneurship, Institutional matching for CREATE, $30,000
2020-2023, Development of a Microwave Enabled Bio-Nano-Microfluidic Device for Point-of-Care Diagnosis of COVID-19, CIHR, 40% of $264,908
2018-2023, Developing Modulated Droplet Microfluidic Systems Towards Robust Nanomaterial Synthesis, NSERC Discovery, $275,000
2020-2022, Air Microfluidics Enabled Edema Sleeve, Praxis Spinal Cord Institute, CBB at UW and Mitacs, $40,000
2018-2022, Droplet Microfluidic Chip-based Protein Fractionation using Capillary Isoelectric Focusing, NSERC-CRD, $200,000
2019-2020, Performance Evaluation of Microwave Sensors, QuantWave Technologies, $23,400
2017-2020, Develop Microfluidic Strategies for Protein Fractionation Compatible with CEInfinite, AES, $100,000
2017-2019, Develop Microfluidic Strategies for Protein Fractionation Compatible with CEInfinite, OCE VIPII, $145,787
2018-2019. Development of a Co-Culture Microfluidic Device that Mimics Vascularized Tissues, NSERC Engage, $25,000
2017-2019, An Infrared System for Measuring Temperature Distribution in Microfluidic Devices, NSERC RTI, $136,242
2014-2019, Droplet Microfluidics and Lab-on-a-Chip Technology, CRC, $500,000
2014-2019, Development of Droplet-based Microfluidic Systems For Pharmaceutical Applications, Institutional match for CRC, $105,000
2017-2018, Development of Techniques for Modifying Surface Properties of Nylon for Oil/Water Separation, NSERC-Engage, $25,000
2013-2018, Droplet-based Microfluidics – Enabling Technology Platform for High-throughput Screening of Material Synthesis, Life Science Research and Food Safety Control, NSERC Discovery, $185,000

i) PUBLICATIONS

1) **Life-time summary**:
Books and monographs: 0
Edited books and monographs: 1

Chapters in books and monographs: 15
Refereed journal articles: 124
Refereed conference publications and presentations: 92
Technical reports: 2
Plenary/keynote addresses: 13
Others (invited presentations not in keynote): 51

2) Details for past seven years

Edited books and monographs

1. CL Ren, AP Lee (Eds), Droplet Microfluidics, Soft Matter Series, Royal Society of Chemistry, Cambridge, UK, 2020.

Chapters in books and monographs

1. CL Ren, AP Lee, "History and Current Status of Droplet Microfluidics", a chapter in Droplet Microfluidics, Soft Matter Series, Royal Society of Chemistry, Cambridge, UK, 2020, 1-14, Ed. CL Ren and AP Lee.
2. M Gilligan, AP Lee, CL Ren, "Challenges and Opportunities–Future Directions", a chapter in Droplet Microfluidics, Soft Matter Series, Royal Society of Chemistry, Cambridge, UK, 2020, 290-293, Ed. CL Ren and AP Lee.
3. M Hebert*, CL Ren, "Droplet Microfluidics for Biomedical Devices", a chapter in Microfluidic Devices for Biomedical Applications, 2nd Ed. X Li and Y Zhou, Woodhead Publishing, 2020
4. X Chen*, CL Ren, "Droplet Microfluidics", a chapter in Smart Sensor Technology, CRC press, Taylor & Francis Group, Boca Raton, FL, 503-526, 2019, 2nd Ed. GK Knopf, AS Bassi.

Papers in refereed Journals

1. A Johnson, R Gao, K Marriott, CR Dickerson, MR Maly, and CL Ren, "Proof of Concept Validation of a Novel Electronics-Free Soft Robotic Knee Brace for Dynamic Unloading During Gait Enabled by Closed-Loop Fluidic Regenerative System for Uni-Compartmental Tibiofemoral Osteoarthritis", J Medical Devices, (MED-23-1073), accepted.
2. W Cui, Z Abbasi, CL Ren, "Real-time Lead Detection Device Based on Nanomaterials Modified Microwave-Microfluidic Sensor", Sens Actu A-Phys, 362 (2023) 114652 (8pp).
3. A Yu, RZ Gao, PS Lee, C Mele, D Dittmer, A Schirm, CL Ren, JY Tung, "Soft Robotics-Inspired Multi-layered Torus-Shaped Displacement Compression Sensing System for Detecting Sinking and Pistoning in Prosthetic Sockets: Proof of Concept Study", Prosthet Orthot Int, (POI-S-22-00207) (accepted.)
4. M Ramasamy, B Ho, CM Phan, N Qin, CL Ren & L Jones, "Inexpensive and Rapid Fabrication of PDMS Microfluidic Devices for Biological Testing Applications Using Low Cost Commercially Available 3D Printers", J Micromech Microeng, accepted, 33 (2023) 105016 (11 pp).
5. Y Zhang, M Shafiei, JZ Wen, Z Abbasi and CL Ren, "Simultaneous Detection of Pressure and Bending Using a Microwave Sensor with Tag and Reader Structure", IEEE Trans Instrum Meas, 72 (2023) 9511311 (11 pp).

6. M Hebert, J Huissoon, CL Ren, “A novel approach to determining the hydrodynamic resistance of droplets in microchannels using active control and grey-box system identification”, J Micromech Microeng, 33 (2023) 085005 (15pp)
7. M Courtney, T Glawdel, CL Ren, “Investigating Peak Dispersion in Free-Flow Counterflow Gradient Focusing due to Electroosmotic Flow”, Electrophoresis, 44 (2023) 646-655.
8. W Cui, Z Ren, Y Song, CL Ren, “Development and potential for point-of-care heavy metal sensing using microfluidic systems: a brief review”, Sens Actu A-Phys, 344 (2022) 113733 (13pp)
9. W Cui, A Abbasi, CL Ren, “Crosstalk Analysis and Optimization in a Compact Microwave-Microfluidic Device Towards Simultaneous Heating and Sensing of Droplets” J Micromech Microeng, 32 (2022) 095005 (10pp).
10. W Cui, P Zhao, J Wang, N Qin, EA Ho, CL Ren, “Reagent free detection of SARS-CoV-2 using an antibody-based microwave sensor in a microfluidic platform”, Lab Chip, 22 (2022) 2307-2314.
11. M Hebert, J Huissoon, CL Ren, “A Quantitative Study of the Dynamic Response of Compliant Microfluidic Chips in a Microfluidics Context”, J Micromech Microeng, 32 (2022) 085004 (9pp).
12. M Hebert, J Huissoon, CL Ren, “A perspective of active microfluidic platforms as an enabling tool for applications in other fields”, J Micromech Microeng, 32 (2022) 043001(15pp)
13. PS Lee, RZ Gao, A Colpitts, RW Murdock, D Dittmer, A Schirm, JY Tung, CL Ren, “Air Microfluidics-Enabled Soft Robotic Transtibial Prosthesis Socket Liner towards Dynamic Management of Residual Limb Contact Pressure and Volume Fluctuation”, Biomicrofluidics, 16, (2022) 034107.
14. R Gao, VNT Mai, N Levinski, JM Kormylo, RW Murdock, CR Dickerson, CL Ren, “A Novel Air microfluidics-Enabled Soft Robotic Sleeve Towards Realizing Innovative Lymphedema Treatment”, Biomicrofluidics , 16 (2022) 034101 (11pp)
15. S Kashyap, Z Almutairi, N Qin, S Bedi, D Johnson, and CL Ren, “Effects of Surfactant Size and Concentration on the Internal Flow Fields of Moving Slug and Disk-like Droplets via μ-PIV”, Chem Eng Sci, 255 (2022) 117668 (10pp).
16. W Kapadia, N Qin, P Zhao, CM Phan, L Haines, L Jones, CL Ren, “Shear-thinning and Temperature-dependent Viscosity Relationships of Contemporary Ocular Lubricants”, Transl Vis Sci Technol, 11 (2022) 1 (10pp)
17. M Marcali, X Chen, M Aucoin, CL Ren, “Droplet Formation of Biological Non-Newtonian Fluid in T-Junction Generators, Part II: Modelling”, Phys Rev E, 105 (2022) 025106 (8pp).
18. M Marcali, X Chen, M Aucoin, CL Ren, “Droplet Formation of Biological Non-Newtonian Fluid in T-Junction Generators, Part I: Experimental Investigation”, Phys Rev E, 105 (2022) 025105 (8pp).
19. T Zablotny, M Courtney · J P Huissoon and CL Ren, “Lensless imaging for droplet identification towards visual feedback-based pressure controlled droplet microfluidic platforms”, Sens Actu A – Phy, 334 (2022) 113338.
20. M Courtney, T Glawdel, CL Ren, “Investigating Peak Dispersion in Free-Flow Counterflow Gradient Focusing”, Electrophoresis, 43 (2022) 776-784.
21. R Gao, CL Ren, “Synergizing Microfluidics with Soft Robotics: A Perspective on Miniaturization and Future Directions”, Biomicrofluidics, 15 (2021) 011302 (28pp)

22. J Farnese, P Zhao and CL Ren, “Effect of Surface Roughness on Bond Strength Between PCTE Membranes and PDMS Towards Microfluidic Applications”, Int J Adhes Adhes, 106 (2021) 102800 (5pp)
23. N Qin, P Zhao, E Ho, G Xin, CL Ren, “Microfluidic Technology for Antibacterial Resistance Study and Antibiotic Susceptibility Testing: review and perspective”, ACS Sensors, 6 (2021) 3-21.
24. A Lau, CL Ren, LP Lee, “Critical Review on Where CRISPR Meets Molecular Diagnostics”, Prog. Biomed. Eng, 3 (2021) 012001 (12pp)
25. W Cui, G Yesiloz, CL Ren, “Microwave heating induced on-demand droplet generation in microfluidic systems”, Anal Chem, 93 (2021) 1266-1270.
26. W Cui, G Yesiloz, CL Ren, “Numerical Simulation Mechanism Study of Microwave Induced Thermo-Capillary Mixing in Droplet Microfluidics”, Chem Eng Sci, 224 (2020) 115791 (9pp).
27. M Courtney, E Thompson, T Glawdel, CL Ren, “Counter-Flow Gradient Focusing in Free-Flow Electrophoresis for Protein Fractionation”, Anal Chem, 92 (2020) 7317-7324.
28. TH Nguyen, A Sedighi, UJ Krull, CL Ren, “A multi-functional droplet microfluidic platform for rapid immobilization of oligonucleotides on semiconductor quantum dots”, ACS Sens, 5 (2020) 746-753.
29. R Gao, M Hebert, J Huissoon, CL Ren, “Customized Pressure Pump System with Compatible Performance to Commercial Systems and Fast Response”, HardwareX, 7 (2020) e00096 (48pp).
30. M Hebert, J Huissoon, CL Ren, “A Quantitative Study of the Dynamic Response of Soft Tubing for Pressure-driven Flow in a Microuidics Context”, Microfluid Nanofluidics, 24(2020) 90 (13pp)
31. M Hebert, J Huissoon, CL Ren, “Silicone-based Soft Matrix Nanocomposite Strain Sensor using Graphene and Silly Putty R”, Sens Actuat A, 305 (2020) 111917 (7pp)
32. D Wong, K Erkorkmaz, CL Ren, “RoboDrop: A Multi-Input Multi-Output Control System for On-Demand Manipulation of Microfluidic Droplets Based on Computer Vision Feedback” IEEE/ASME T-MECH, 25 (2020) 1129-1137.
33. P Pezeshkpour, G Schneider, CL Ren, “A Shape Factor Model for Injection Analysis of Microchip Sample Electrophoresis”, Numer Heat Tr A-Appl, 77 (2020) 1-12
34. M Hebert, M Courtney, CL Ren, “Semi-automated, precise on-demand control of individual droplets with T junction multiplexing and a demonstrated application to a drug screening assay”, Lab Chip, 19 (2019), 1490-1501.
35. P Pezeshkpour, G Schneider, CL Ren, “Time and Length Scales in Governing Equations and Boundary Conditions for On-Chip Electrophoretic Sample Separation”, Numer Heat Tr A-Appl, 76 (2019) 1-18.
36. P Pezeshkpour, G Schneider, CL Ren, “Poisson-Boltzmann Equation for Microfluidic Transport Phenomena with Statistical Thermodynamics Approach”, J Thermophys Heat Transfer, 33 (2019) 462-471.
37. M Courtney, CL Ren, “Counter-Flow Gradient Electrophoresis for Focusing and Elution”, Electrophoresis,40 (2019) 643-658.
38. P Zhao, L LeSergent; J Farnese; JZ Wen; CL Ren, “Electrophoretic deposition of carbon nanotubes on semi-conducting and non-conducting substrates”, Electrochem Communications, 108 (2019) 106558 (pp5).

39. P Zhao, N Qin, CL Ren, JZ Wen, “Surface modification of polyamide meshes and nonwoven fabrics by plasma etching and a PDA/cellulose coating for oil/water separation”, Appl Surf Sci, 481 (2019) 883-891.
40. P Zhao, N Qin, CL Ren, JZ Wen, “Polyamide 6.6 separates oil/water due to its dual underwater oleophobicity/underoil hydrophobicity: Role of 2D and 3D porous structures”, Appl Surf Sci, 466 (2019) 282-288
41. A Grimmer, X Chen, M Hamidovi, W Haselmayr, CL Ren, R Wille, “Simulation Before Fabrication: A Case Study on the Utilization of Simulators for the Design of Droplet Microuidic Networks”, RSC Adv, 8 (2018) 34733-34742.
42. N Qin, JZ Wen, B Chen, CL Ren, “On Nonequlibrium Shrinkage of Supercritical CO2 Droplets in a Water Carrier Microflow”, Appl Phy Lett, 113 (2018) 033703 (5pp).
43. N Qin, Y Feng, JZ Wen, CL Ren, “Numerical Study on Single Flowing Liquid and Supercritical CO2 Drop in Microchannel: Thin Film, Flow Fields, and Interfacial Profile”, Inventions, 3 (2018) 35 (18pp).
44. N Qin, JZ Wen, CL Ren, “Hydrodynamic Shrinkage of Liquid CO2 Taylor Drops in a Straight Microchannel”, J Phys: Condens Matter, 30 (2018) 094002 (18pp)
45. TH Nguyen, X Chen, A Sedighi, U Krull, CL Ren, “Development of single encapsulation and well-mixing platform for fast conjugating magnetic bead and quantum dot via electrostatic bonding”, Microfluidics Nanofluidics, 22(2018) 63 (9pp).
46. B Yu, C Elbuken, C Shen, J Huissoon, CL Ren, “An integrated microfluidic device for the sorting of yeast cell cycle phases using image processing”, Sci Reports, 8 (2018) 3550 (12pp).
47. Y Zhang, H Zeng, S Mao, S Kondo, H Nakajima, S Kato, CL Ren, K Uchiyama, “A reversibly electro-switchable surface enabling manipulation of multifarious properties”, ACS Appl Mater Interfaces, 10(2018) 23247-23253.
48. P Zhao, N Qin, JZ Wen, CL Ren, “Photocatalytic performances of ZnO nanoparticle film and vertically aligned nanorods in chamber-based microfluidic reactors: reaction kinetics and flow effects”, Appl Catal B-Environ, 209 (2017) 468-475.
49. D Tong, G Yesiloz, M, CL Ren, CMR Madhuranthakam, “Controlled Synthesis of Poly (Acrylamide-co-Sodium Acrylate) Copolymer Hydrogel Micro-particles in a Droplet Microfluidic Device for Enhanced Properties”, Ind Eng Chem Res, 56 (2017) 14972–14979.
50. N Qin, JZ Wen, CL Ren, “Highly pressurized partially miscible liquid-liquid flow in a micro T-junction, Part II – Theoretical justification and Modelling”, Phys Rev E, 95 (2017) 043111 (9pp)
51. N Qin, JZ Wen, CL Ren, “Highly pressurized partially miscible liquid-liquid flow in a micro T-junction, Part I – Experimental observations”, Phys Rev E, 95 (2017) 043110 (12pp)
52. E Amstad, X Chen, M Eggersdorfer, N Cohen, T Kodger, CL Ren, DA Weitz, “The influence of the geometry of flow focusing junctions on the operation of microfluidic drop makers”, Phys Rev E, 95 (2017) 043105 (6pp)
53. X Chen, CL Ren, “A Microfluidic Chip Integrated with Droplet Generation, Pairing, Trapping, Merging, Mixing and Releasing”, RSC Advances 7 (2017) 16738-16750.
54. X Chen, A Brukson, CL Ren, “Droplet Merging Design for Controlled Reaction Volumes”, Microfluidics Nanofluidics, 21 (2017) 34 (10pp).

55. X Chen, CL Ren, “Experimental Study on droplet generation in a flow focusing device using stratified flow with viscosity contrast and its impact on single encapsulation”, Chem Eng Sci 163 (2017) 1-10.
56. M Courtney, X Chen, S Chan, T Mohamed, P N Rao, CL Ren, “The design and optimization of a microfluidic device for trapping and releasing droplets on demand”, Anal Chem 89 (2017) 910–915.
57. G Yesiloz, MS Boybay, CL Ren, “A Microwave Based Microfluidic Mixing via Thermal Capillary and Marangoni Effect”, Anal Chem, 89 (2017) 1978 – 1984.

Refereed conference publications and presentations

1. PS Lee, C. Sjaarda, R. Cornelious, R Gao, K Lu, and CL Ren, “Naturally Compliant Dexterous Anthropomorphic Hand via Novel Modular Soft-Rigid Hybrid Robotics Approach: Design Rationale, Assembly Methods, and Evaluation”, 32nd IEEE International Conference on Robot and Human Interactive Communication. Submission number: ROMAN23_0398_MS, Aug 28-31, 2023, Busan, Korea.
2. NV Giri, W Cui, CL Ren, "Experimental investigation into Thread Formation during Drop Generation by Pseudoplastic Viscoelastic Fluid at T Junction Generators", NSERC CREATE Summit 2023, May 1- 3, York University, Toronto, Ontario, Canada.
3. Y Zhang, PS Lee, CL Ren, “Flexible Bending Sensor Under Sliding Mode Installation”, CSME congress, May 28-31, 2023, University of Sherbrooke, Sherbrooke, Canada.
4. J Savage, CL Ren, C Dickerson and VNT Mai, “The Effect of Diameter and Length on Blocked Force and Free Contraction of Various Pneumatic Artificial Muscles”, CSME congress, May 28-31, 2023, University of Sherbrooke, Sherbrooke, Canada.
5. VNT Mai, S Dykstra, RZ Gao and CL Ren, “Empirically modelling compression garment pressure on a lymphedema-affected multilayered tissue model”, CSME congress, May 28-31, 2023, University of Sherbrooke, Sherbrooke, Canada.
6. W Cui, J Wang, C Ding, E Ho, CL Ren, “Reagent Free Detection of E. coli O157-H7 in Water Samples Using an Antibody Functionalized Microwave Biosensor”, Global Water Future, May 15-17, 2023; TCU Place, Saskatoon, Canada.
7. R Gao, M Maly, CL Ren, “Methods and Preliminary Testing of a Novel Closed-loop Fluidic Regenerative System for Dynamic Unloading in Uni-compartmental Tibiofemoral Osteoarthritis”, North American Congress on Biomechanics, August 21 – 25, 2022, Ottawa, Ontario, Canada.
8. Mele, C., Inkol, K., Gao, R.Z., Tung, J.Y., and Mombaur, K. (2022) Preliminary Modelling, Development and Validation of a Dynamic Exoskeleton-Human Test Bench for the Evaluation of Two Strapping Interaction Models. World Congress of Biomechanics (International). Oral Presentation.
9. M ShafieiDarabi, Z Abbasi, CL Ren, “Passive Disposable Microwave Sensor for Online Microplastic Contamination Monitoring”, (oral), 2022 IEEE MTT-S International Microwave Symposium, 19-24 June 2022, Denver, CO, USA.
10. W Kapadia, N Qin, P Zhao, CM Phan, L Haines, L Jones, CL Ren, “Microfluidic Viscometer for Measuring the Viscosity of Small Volume Non-Newtonian Liquid Samples”, ASME Fluids Engineering Summer Conference, Aug. 1-3, 2022, Toronto, Canada.

11. W Cui, P Zhao, J Wang, N Qin, E Ho, CL Ren, “A functionalized microwave sensor in a microfluidic platform for rapid detection of SARS-CoV-2”, (poster) microTAS, Oct 10-14, 2021, Palm Springs, California, USA.
12. M Courtney, T Glawdel, and CL Ren, “A Microfluidic Device for Free-Flow Counterflow Gradient Focusing”, (poster) microTAS, Oct 10-14, 2021, Palm Springs, California, USA.
13. M Marcali, MG Aucoin, and CL Ren, “Hemagglutination Assay to Quantify Influenza A Virus Like Particles in Droplets”, (poster) microTAS, Oct 10-14, 2021, Palm Springs, California, USA.
14. Z Abbasi, W Cui, M Baghelani, and CL Ren, “Dispoosable Chipless Microwave-Microfluidic Sensor for Label-free Multivariable Sweat Analysis” (poster) microTAS, Oct 10-14, 2021, Palm Springs, California, USA.
15. Z Abbasi, W Cui, CL Ren, Metamaterial-inspired RF Chipless Tag for Real-time Non-invasive Monitoring in Microfluidic Device, CSME congress, Jun 27-30, 2021, Charlottetown, PE, Canada.
16. M Courtney, T Glawdel, CL Ren, Asymmetric Peak Behaviour in Free-Flow Counterflow Gradient Focusing, 37th International Symposium on Microscale Separations and Bioanalysis, July 12-15, 2021, virtual.
17. W Cui, Z Ren, Z Abbasi, Y Song, CL Ren, Real-time Non-contact Water Salinity Measurement Using Planar Resonator-based Microwave Microfluidic Sensor, The 2021 Global Water Futures (GWF) Annual Open Science Meeting (GWF2021), May 17-19, 2021
18. W Cui, Z Ren, Z Abbasi, Y Song, CL Ren, A Microwave Enabled Microfluidic Platform Incorporated with Nanomaterials for Real-time Lead Detection in Water, The 2021 Global Water Futures (GWF) Annual Open Science Meeting (GWF2021), May17-19 (virtual)
19. R Gao, K Marriott, P He, CR Dickerson, MR Maly, CL Ren, “Development of a Novel Tibiofemoral Dynamic Unloading Knee Brace with Air Bladder Insert and Wearable Control Box”, XXVIII Congress of the International Society of Biomechanics (ISB), 25-29 July 2021 (virtual).
20. J Farnese, CL Ren, “Development of Alphaxon’s Phax-1 Protein Fraction System”, Biotech Virtual 2021, Jan 27-29, 2021.
21. W Cui, Z Ren, Y Song, CL Ren, “Detection of Lead in Drinking Water using a Microwave Sensor Integrated with a Microfluidic System”, GWF2020: 2020 Global Water Future Annual Meeting, May 4-5, Waterloo, Ontario, Canada (changed to online poster due to COVID-19)
22. W Cui, Z Ren, Y, Song, CL Ren, “Development and potential of heavy metals detection based on microfluidic systems”, GWF2020: 2020 Global Water Future Annual Meeting, May 4-5, Waterloo, Ontario, Canada (changed to online poster due to COVID-19)
23. RZ Gao, K Marriott, CR Dickerson, MR Maly and CL Ren, “Design and Preliminary Implementation of an Air Microfluidics Enabled Soft Robotic Knee Brace Towards the Management of Osteoarthritis”, 2020 42nd Annual International Conference of the IEEE Engineering in Medicine and Biology Society (EMBC), July 20-24, 2020, Montreal, QC, Canada, 4502-4505 (changed to virtual meeting due to COVID-19).
24. PS Lee, RZ Gao, J Tung, and CL Ren, “Research and Development of an Active Prosthetic Socket via Air-Microfluidic Enabled Soft Robotics”, 2020 42nd Annual International Conference of the IEEE EMBC, July 20-24, 2020, Montreal, QC, Canada (poster) (changed to virtual meeting due to COVID-19).

25. M Hébert, J Huissoon and CL Ren, “A Quantitative Study of the Dynamic Response of Soft Tubing in a Microfluidics Context for Pressure-Driven Flow”, CSME2019: 2019 CSME International Congress, June 2-5, London, Ontario, Canada.
26. J Farnese, M Courtney*, CL Ren, “A Novel Continuous Electrophoretic pH Elution Separation Technique”, CSME2019: 2019 CSME International Congress, June 2-5, London, Ontario, Canada.
27. HAT Nguyen, SW Chan, EKF Yim, CL Ren, “Encapsulation of Single Cells with Gelatin-Methacryloyl (GelMA) on Microfluidic Device using a Stratified Flow with Viscosity Contrast”, CSME2019: 2019 CSME International Congress, June 2-5, London, Ontario, Canada.
28. W Cui, CL Ren, “Microwave Sensing Feedback Controlled Heating Process in a Single Microfluidic Chip”, CSME2019: 2019 CSME International Congress, June 2-5, London, Ontario, Canada.
29. HAT Nguyen, A Sedighi, U Krull, and CL Ren, “A Complex Droplet-based Microfluidic Platform for Rapid Immobilization of Oligonucleotides on Semiconductor Quantum Dots”, 71st Annual Meeting of the APS Division of Fluid Dynamics, Nov 18-20, 2018, Atlanta, GA, USA.
30. W Cui and CL Ren, “Investigation of the Crosstalk Between Multiple Resonators in a Single Chip for Simultaneous Heating and Sensing in Microfluidic System”, 71st Annual Meeting of the APS Division of Fluid Dynamics, Nov 18-20, 2018, Atlanta, GA, USA.
31. M Courtney, E Thompson, T Glawdel and CL Ren, “Velocity Gradient Focusing in a Free-Flow Electrophoresis Device for Protein Fractionation”, 71st Annual Meeting of the APS Division of Fluid Dynamics, Nov 18-20, 2018, Atlanta, GA, USA.
32. M Hébert, J Huissoon and CL Ren, “An Investigation of the Hydrodynamic Resistance of Droplets in Microchannels using Active Control”, 71st Annual Meeting of the APS Division of Fluid Dynamics, Nov 18-20, 2018, Atlanta, GA, USA.
33. RZ Gao, M Hebert, CL Ren, “Pneumatic Pressure Contorl: An Open-Source Droplet Microfluidic System”, CSME2018: 2018 CSME International Congress, May27-30, Toronto, Canada.
34. M Hebert, J Huissoon and CL Ren, “Using visual feedback assisted active control to investigate the hydrodynamic resistance of nanoliter-sized droplets in a microchannel”, CSME2018: 2018 CSME International Congress, May27-30, Toronto, Canada.
35. M Courtney, T Glawdel and CL Ren “The Evaluation of a Free-Flow Electrophoresis Device with a Velocity Gradient for Enhanced Protein Fractionation”, CSME2018: 2018 CSME International Congress, May27-30, Toronto, Canada.
36. CL Ren, “Microwave Sensing and Heating of Individual Droplets and Droplet Trapping, Splitting and Merging with Feedback Controls”, Gordon Research Conference on the Physics & Chemistry of Microfluidics, Jun.4 – Jun. 9, 2017, Lucca, Italy (oral).
37. M Hébert, CL Ren, “Visual feedback assisted active control of droplets in microchannels for pressure-driven flow”, Gordon Research Conference: Physics and Chemistry of Microfluidics, Barga, Italy, June 4-9, 2017 (Poster).
38. T H Nguyen, X Chen, A Sedighi, UJ Krull, CL Ren, “Development of co-encapsulating and well-mixing droplet microfluidic platform for rapid immobilizing semiconductor quantum dots

(CdSe/ZnS) onto micro-sized magnetic beads", Ontario-on-a-Chip Symposium, Toronto, ON, Canada, May 25-26, 2017 (Poster).

39. M Hébert, CL Ren, "Visual feedback assisted active control of droplets in microchannels for pressure-driven flow", Ontario-on-a-Chip Symposium, Toronto, ON, Canada, May 25-26, 2017 (Poster).

Technical reports

1. P Zhao, N Qin, CL Ren, "Development of Nylon for Oil/Water Separation", submitted to MW Canada, 2017.

Plenary/keynote addresses

1. CL Ren, Keynote speaker, "Fabrication Methods for Microfluidics-based Diagnosis and Soft Robotics-based Therapeutic Treatment", the International Conference on Biofabrication, Saskatoon, Canada, Sept 17-20, 2023.
2. CL Ren, Keynote speaker, "Treating Your Career Development as a Research Project", Academic Career Conference 2022 at University of Waterloo, Oct 13, 2022.
3. CL Ren, Keynote Speaker, "Microwave Sensing for Microfluidic Platforms towards Environmental, Pharmaceutical and Biomedical Applications", 7th International Conference on Sensors and Electronic Instrumentation Advances, Palma De Mallorca, Spain, September 22-24, 2021.
4. CL Ren, "Microwave Sensors towards High Throughput Chemical Reactions", 18th International Meeting on Chemical Sensors IMCS 2021, virtual, May 30-Jun 3, 2021.
5. CL Ren, Plenary Speaker, "Microwave Assisted Polymerization in Droplet-based Lab-on-a-Chip Platform", ASME ICNMM, St. Johns, Newfoundland, Canada, June 23-27, 2019.
6. CL Ren, Keynote Speaker, "Droplet-based Lab-on-a-Chip Platform with Active Control for High Throughput Analysis", 27th Canadian Congress of Applied Mechanics (CANCAM), Sherbrooke, QC, Canada, May 27-30, 2019.
7. CL Ren, Keynote Speaker, "Microwave Assisted Polymerization in Droplet-based Lab-on-a-Chip Platform", 5th International Conference and Exhibition on Polymer Chemistry, Toronto, Canada, August 27-28, 2018.
8. CL Ren, Keynote Speaker, "Visual or Electrical Sensing Feedback Assisted Active Control of Droplets in Microchannels Towards Automated, Modular Lab-on-a-Chip Platform", International Microfluidics Congress, San Diego, US, August 13-14, 2018.

Others (invited presentations not in keynote)

1. Microfluidics Enabled Soft Robotic Wearable Systems for Biomedical Applications, 2023 IEEE-NANOMED, Dec 5-8, 2023, Okinawa, Japan.
2. Microfluidics Platform Technologies for Biomedical Applications., Dec 3, 2023, University of Tokyo.
3. Microfluidics Platform Technologies for Protein Fractionation and Drug Screening Applications., Aug 22, 2023, Ontario's Symposium on Micro and Nanotechnology, Queen's University, Kingston, Canada.

4. “Microfluidics – Enabling Technology for Biomedical Applications”, Microfluidis, BioMEMS, and Medical Microsystems conference, BIOS Symposium, SPIE Photnoics West, 28 January – 2 February 2023, San Francisco, California, United States
5. “Air Microfluidics for Soft Robotic Medical Wearables”, Medical Wearables 2022, online, Dec. 6-8, 2022.
6. “Microfluidics – Enabling Technology for Biomedical Applications”, TU Delft University, the Netherlands, May 30, 2022
7. “Talking tiny: Virtual workshop explores the game-changing potential of nanotechnology in the water sector”, https://uwaterloo.ca/water-institute/news/talking-tiny-virtual-workshop-explores-game-changing, Feb 15, 2022
8. “Microwave Sensors towards High Throughput Chemical Reactions”, 18th International Meeting on Chemical Sensors IMCS 2021, Virtual, May 30-Jun 3, 2021.
9. “Droplet Microfluidics and Soft Robots”, University of Saskatchewan, May 2019.
10. “Droplet Microfluidics, Enabling Technology for High Throughput Screening”, Sun Yat-Sen University, Guangzhou, China, December, 2018.
11. “Droplet Microfluidics, Enabling Technology for High Throughput Screening”, Tsinghua University, Beijing, China, August, 2018.
12. “Microwave Sensing and Heating of Individual Droplets and Droplet Trapping, Splitting and Merging with Feedback Controls”, Gordon Research Conference on the Physics & Chemistry of Microfluidics, Jun.4 – Jun. 9, 2017, Lucca, Italy (oral)
13. “Droplet Microfluidics-Fundamentals and Applications”, 2017 Canadian Association of Physics Congress, May 29-June 2, 2017, Kingston, Ontario, Canada

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