QIN MAGGIE QI

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PROFESSIONAL EXPERIENCE

James R. Mares '24 Career Development Chair Assistant Professor 2022
Department of Chemical Engineering, Massachusetts Institute of Technology
Member of Multi-Cellular Engineered Living Systems, Massachusetts Institute of Technology
Member of the Program in Polymers and Soft Matter, Massachusetts Institute of Technology
Member of Computational & Systems Biology Program, Massachusetts Institute of Technology

Postdoctoral Associate 2021
Department of Chemical Engineering, Massachusetts Institute of Technology

Postdoctoral Fellow 2018 - 2021
School of Engineering and Applied Sciences, Harvard University
Wyss Institute for Biologically Inspired Engineering, Harvard University
Advisor: Professor Samir Mitragotri

Visiting Scientist 2015, 2017
Dermot Kenny Lab, Royal College of Surgeons in Ireland

Visiting Scientist, Becton Dickinson Biosciences Company 2017

Teaching Assistant, Stanford University 2014 - 2015

Research Assistant 2013
Gerald G. Fuller Lab, Department of Chemical Engineering, Stanford University

Research Assistant 2011 - 2013
Yong L. Joo Lab, School of Chemical and Biomolecular Engineering, Cornell University

Teaching Assistant, Cornell University 2012 - 2012

Process Engineering Intern, Qingdao Refining and Chemical Co Ltd, Sinopec Group 2012

Quantitative Analyst Intern, Everbright Pramerica Fund Management Co., Shanghai 2010

EDUCATION

Stanford University, Stanford, CA June 2018
Ph.D. Chemical Engineering
Thesis Advisor: Professor Eric S.G. Shaqfeh
Title: *Understanding Particle Migration, Margination and Adhesion in Cellular Suspensions*

Stanford University, Stanford, CA June 2017
M.S. Chemical Engineering

Cornell University, Ithaca, NY May 2013
B.S. Chemical Engineering
B.S. Operations Research

AWARDS AND HONORS

13. NSF CAREER Award 2024
12. Science Influencer Mentor, Texas A & M University 2023, 2024
11. FY23 Research Support Committee Award, Massachusetts Institute of Technology 2022

10. Semi-finalist Honoree, University of Washington Distinguished Young Scholars 2019
9. Selected to attend University of Delaware Future Faculty Workshop at Princeton University 2019
8. Participant of MIT Rising Star in ChemE Program 2018
7. Stanford Graduate Fellowship in Science and Engineering 2014 - 2017
6. T.S. Lo Graduate Fellowship, Stanford University 2013 - 2014
5. Cornell University Chemical Engineering Undergraduate Research Award 2013
4. Cornell Engineering Learning Initiatives Research Award 2012
3. Rockwell Collins Scholarship, Society of Women Engineers (turned down) 2011 - 2012
2. College of Engineering Dean's List, Cornell University 2009 - 2013
1. Selected to attend Leadershape Summer Program, Cornell University 2010

PUBLICATIONS

Published Journal Articles

11. V. Suja*, Q.M.Qi*, K. Halloran, J.Zhang, S. Shaha, S. Prakash, N. Kumbhojkar, A. Deslandes, S. Huille, Y.Gokarn and S.Mitragotri, "A biomimetic chip to assess subcutaneous bioavailability of monoclonal antibodies in humans", *PNAS Nexus* **2**, 10 (2023).

10. Z.Zhao*, D.C.Pan*, Q.M.Qi, J.Kim, N.Kapate, T.Sun, C.W.Shields, L.L.Wang, D.Wu, C.Kwon, W.He, J.Guo, and S. Mitragotri, "Engineering of Living Cells with Polyphenol-Functionalized Biologically Active Nanocomplexes", *Advanced Materials* , 2003492 (2020).

9. Q.M.Qi, M.Duffy, A.M.Curreri, J.P.R.Balkaran, E.E.L.Tanner and S.Mitragotri, "Comparison of Ionic Liquids and Chemical Permeation Enhancers for Transdermal Drug Delivery", *Advanced Functional Materials* , 2004257 (2020).

8. V.Dharamdasani, A.Mandal, Q.M.Qi, I.Suzuki, M.V.L.B.Bentley and S.Mitragotri, "Topical Delivery of siRNA into Skin using Ionic Liquids", *Journal of Controlled Release* **475-482**, 323 (2020).

7. Q.M.Qi and S.Mitragotri, "Mechanism of transdermal delivery of macromolecules assisted by ionic liquids", *Journal of Controlled Release* **311-312**, 162-169 (2019).

6. Q.M.Qi, I.Oglesby, J.Cowman, A.J.Ricco, D.Kenny and E.S.G.Shaqfeh, "*In-vitro* measurement and modeling of platelet adhesion on VWF-coated surfaces in channel flow", *Biophysical Journal* **116**, 6 (2019).

5. E.Dunne, Q.M.Qi, E.S.G.Shaqfeh, A.J.Ricco, J.O'Donnell and D.Kenny, "Blood group alters platelet binding kinetics to von Willebrand factor and consequently platelet function", *Blood* **133**, 12 (2018).
Commentary by J.Dong, "ABO on platelets goes beyond transfusion", DOI: 10.1182/blood-2019-02-898791

4. Q.M.Qi and E.S.G.Shaqfeh, "Time-dependent particle migration and margination in the pressure-driven channel flow of blood", *Physical Review Fluids* **3**, 034302 (2018).

3. Q.M.Qi and E.S.G.Shaqfeh, "Theory to predict particle migration and margination in the pressure-driven channel flow of blood", *Physical Review Fluids* **2**, 093102 (2017).

2. S.Fitzgibbon, A.P.Spann, Q.M.Qi and E.S.G.Shaqfeh, "In vitro measurement of particle margination in the microchannel flow: effect of varying hematocrit", *Biophysical Journal* **108**, 10 (2015).

1. C.M.Elkins, Q.M.Qi and G.G.Fuller, "Corneal cell adhesion to contact lens hydrogel materials enhanced via tear film protein deposition", *PloS One* **9.8**, e105512 (2014).

Published Book Chapter

1. Q.M.Qi and E.S.G.Shaqfeh, "Microstructure and rheology of cellular blood flow, platelet margination and adhesion", *Dynamics of blood cells in microflows* **101-124**, edited by A.Viallat and M.Abkarian, Taylor & Francis Group (2019).

Manuscript in Review

1. I. Pincus and Q.M.Qi, "Nanoparticle-induced lipid membrane deformation influences the design of biomedicine", , submitted 2025.

Manuscript in Preparation

1. Poonpat Dumnoenchanvanit, Michaela Sinclair and Q.M.Qi, "Aqueous ionic liquid microstructures for efficient lipid extraction in microalgal biofuel production", .

Patent

1. S. Mitragotri and Q.Qi, US21/52134, "Systems and Methods Relating to Subcutaneous Administration".

SELECT CONFERENCE PRESENTATIONS AND SEMINARS

33. "In vitro and in silico modeling of thrombosis and thrombosis-inspired drug delivery", Q.M.Qi, 3rd International School on HemoPhysics (**invited talk**), Montpellier, France, 2024

32. "Microfluidic Flow for Health: from Bleeding to Drug Delivery", Q.M.Qi, Centre interdisciplinaire de nanosciences de Marseille, CNRS Aix-Marseille University (**invited talk**), Marseille, France, 2024

31. "Modelling particle-membrane interactions for biomaterial designs", Q.M.Qi, Centre de Biologie Structurale, University of Montpellier (**invited talk**), Montpellier, France, 2024

30. "Modelling particle-membrane interactions for biomaterial designs", Q.M.Qi, Massachusetts Institute of Technology PPSM seminar, Cambridge, MA, 2024

29. "Modelling particle-membrane interactions for biomaterial designs", Q.M.Qi, The 100th New England Complex Fluids Workshop (**invited talk**), Waltham, MA, 2024

28. "Modelling particle-membrane interactions for biomaterial designs", Q.M.Qi, The 26th International Congress of Theoretical and Applied Mechanics, Daegu, Korea, 2024

27. "Microfluidic Flow for Health: from Bleeding to Drug Delivery ", Q.M.Qi, 2024 Hemostasis Gordon Research Conference (**invited talk**), Waterville Valley, New Hampshire, 2024

26. "Modelling particle-membrane interactions for biomaterial designs ", Q.M.Qi, 98th ACS Colloids and Surface Science Symposium (**invited talk**), Seattle, WA, 2024

25. "Microfluidic Flow Dynamics for Health: Bridging Experimental and Computational Approaches for Precision Medicine ", Q.M.Qi, St Louis University Edward A. Doisy Department of Biochemistry & Molecular Biology (**invited talk**), St Louis, MO, 2024

24. "Microfluidic Flow Dynamics for Health: Bridging Experimental and Computational Approaches for Precision Medicine ", Q.M.Qi, MIT Industrial Liaison Program (**invited talk**), Tokyo, Japan, 2024

23. "Modelling the Effects of Particle Surface Loading on Uptake and Cell Deformation ", Q.M.Qi, I.Pincus, Annual Meeting of the American Physics Society Division of Fluid Dynamics, DC, 2023, Annual Meeting of the American Institute of Chemical Engineers, Orlando, FL, 2023

22. "Microfluidic Flow for Health: from Bleeding to Drug Delivery", Q.M.Qi, Boston Children's Hospital Ophthalmology Seminar Series (**invited talk**), Boston, MA, 2022

21. "Complex Fluids in Microchannel Flows: from Bleeding to Drug Delivery", Q.M.Qi, Program in Polymers and Soft Matter (**invited talk**), Massachusetts Institute of Technology, 2022

20. "A Microphysiological Model of Blood Cell Endothelium Interactions to Study Drug Delivery Mechanisms", Q.M.Qi, J. Guo, C. Hamadani and S. Mitragotri, 19th U.S. National Congress on Theoretical and Applied Mechanics (**invited talk**), Austin, TX, 2022

19. "A Microphysiological System for Ocular Drug Testing", Q.M.Qi, Massachusetts Eye and Ear (**invited talk**), Boston, MA, 2022

18. "A Microphysiological System for Ocular Drug Testing", Q.M.Qi, Massachusetts Institute of Technology (**invited talk**), Virtual, 2021

17. "Complex Fluids in Microchannel Flows: from Bleeding to Drug Delivery", Q.M.Qi, National ChemE Future Faculty Virtual Seminar Series (**invited talk**), Virtual, 2021

16. "Complex Fluids in Microchannel Flows: from Bleeding to Drug Delivery", Q.M.Qi, Stanford University (**invited talk**), Virtual, 2021

15. "Complex Fluids in Microchannel Flows: from Bleeding to Drug Delivery", Q.M.Qi, University of British Columbia (**invited talk**), Virtual, 2021

14. "Complex Fluids in Microchannel Flows: from Bleeding to Drug Delivery", Q.M.Qi, Massachusetts Institute of Technology (**invited talk**), Virtual, 2021

13. "Complex Fluids in Microchannel Flows: from Bleeding to Drug Delivery", Q.M.Qi, University of Wisconsin Madison (**invited talk**), Virtual, 2021

12. "Complex Fluids in Microchannel Flows: from Bleeding to Drug Delivery", Q.M.Qi, Johns Hopkins University (**invited talk**), Virtual, 2021

11. "A Microfluidics-Based Approach to Model Drug Transport across 2D and 3D Biological Barriers", Q.M.Qi, J.Guo, C.Hamadani and S.Mitragotri, Annual Meeting of the American Institute of Chemical Engineers, Virtual, 2020

10. "A Microfluidic Model to Assess Subcutaneous Transport and Pharmacokinetics in Vitro", Q.M.Qi and S.Mitragotri, Annual Meeting of the American Institute of Chemical Engineers, Virtual, 2020

9. "Evaluation of Ammonium-Based Ionic Liquids As Novel Chemical Permeation Enhancers for Transdermal Drug Delivery", Q.M.Qi, M.Duffy, E.E.L.Tanner and S.Mitragotri, Annual Meeting of the American Institute of Chemical Engineers, Virtual, 2020

8. "Biologically Inspired Complex Fluids and Soft Matter", Q.M.Qi, Global Forum for Young Scholars of Sichuan University (**invited talk**), Virtual, 2020

7. "Blood Group Alters Platelet Binding Kinetics And Translocation Dynamics Under Arterial Shear", Q.M.Qi, E.Dunne, D.Kenny, J.O'Donnell, A.J.Ricco, I.Schoen and E.S.G. Shaqfeh, Annual Meeting of the American Institute of Chemical Engineers, Orlando, FL, 2019

6. "Mechanism of Transdermal Delivery of Macromolecules Assisted by Ionic Liquids", Q.M.Qi and S.Mitragotri, Gordon Research Conference: Preclinical Form and Formulation for Drug Discovery, Waterville Valley, NH (poster), 2019

5. "In-vitro Measurement and Modelling of Platelet Adhesion on Von-Willebrand-Factor-Coated Surfaces in Channel Flow", Q.M.Qi, I.Oglesby, E.Dunne, D.Kenny, J.O'Donnell, A.J.Ricco, I.Schoen and E.S.G. Shaqfeh, Annual Meeting of the American Physics Society Division of Fluid Dynamics, Denver, CO, 2017, Annual Meeting of the American Institute of Chemical Engineers, Minneapolis, MN, 2017

4. "Time Evolution of Shear-Induced Particle Margination and Migration in a Cellular Suspension", Q.M.Qi and E.S.G.Shaqfeh, Annual Meeting of the American Physics Society Division of Fluid Dynamics, Portland, OR, 2016

3. "A Coarse-Grained Theory to Predict Particle Margination and Migration in Blood Suspensions", Q.M.Qi and E.S.G.Shaqfeh, 23rd International Congress of Theoretical and Applied Mechanics, Montreal, Canada, 2016

2. "Accelerating Blood Simulations: a Coarse-Grained Theory to Understand Cellular Suspensions", Q.M.Qi and E.S.G.Shaqfeh, Society for Industrial and Applied Mechanics (**invited talk**), Boston, MA, 2016

1. "Coarse-Grained Theory to Predict Red Blood Cell Migration in Pressure-Driven Flow at Zero Reynolds Number", Q.M.Qi and E.S.G.Shaqfeh, Annual Meeting of the American Physics Society Division of Fluid Dynamics, Boston, MA, 2015

TEACHING EXPERIENCE

8. **Instructor**, Massachusetts Institute of Technology — Fall 2024
10.52 Mechanics of Fluids

7. **Instructor**, Massachusetts Institute of Technology — Fall 2022, 2023
10.50 Analysis of Transport Phenomena

6. **Instructor**, Massachusetts Institute of Technology — Spring 2022, 2023, 2024
10.32 Separation Processes

5. **Senior thesis advisor**, Bioengineering, Harvard University — 2019 - 2020
ES 100: Engineering Design Principles

4. **Teaching assistant**, Department of Chemical Engineering, Stanford University — 2014 - 2015
CHEMENG 300: Applied Mathematics in the Chemical and Biological Sciences

3. **Teaching assistant**, School of Chemical and Biomolecular Engineering, Cornell University 2012
ENGRI 1120: Introduction to Chemical Engineering

2. **Grader**, School of Chemical and Biomolecular Engineering, Cornell University — 2012
CHEME 6400: Polymeric Materials

1. **MATLAB consultant**, Department of Computer Science, Cornell University — 2010 - 2011
CS 1112: Introduction to MATLAB

MENTORING EXPERIENCE

49. Youngjin Lee, **Postdoc**, MIT 2025 - Present
    Project: modeling ionic liquids and particle-cell interactions
48. Xi Liu, **Postdoc**, MIT 2025 - Present
    Project: microfluidic culturing of stem cell-derived retinal organoids
47. Konstantinos Zinelis, **Postdoc**, MIT 2024 - 2025
    Project: multiscale modeling of nanoparticle-cell interactions
46. Andrea Goertzen, **PhD candidate**, MIT 2024
    Project: glaucoma immunopathology in vitro
45. Etienne Boulais, **Postdoc**, MIT 2024
    Project: ionic liquids for biofuel production
44. Isaac Pincus, **Postdoc**, MIT 2022 - 2024
    Project: biomechanical modeling of cellular drug carriers
43. Efstathios Iliakis **PhD candidate**, MIT 2024
    Project: ionic liquids for biomaterial design
42. Nicholas King, **PhD candidate**, MIT 2022 - 2024
    Project: biomechanical modeling of leukocyte and leukocyte-based drug carriers
41. Bob Zhang, **PhD candidate**, MIT 2022
    Project: microfluidic systems to model retinal diseases
40. Miranda Wang, **PhD rotation student**, MIT 2022
    Project: improving retinal organoid cultures using microfluidics
39. Talia Zheng, **PhD thesis committee**, advisor: Patrick S. Doyle, MIT 2023 - Present
38. Mateusz Wojtaszek, **PhD thesis committee**, advisor: Patrick S. Doyle, MIT 2022 - Present
37. Lucas Attia, **PhD thesis committee**, advisor: Patrick S. Doyle, MIT 2022 - Present
36. Shakul Pathak, **PhD thesis committee**, advisor: Martin Z. Bazant, MIT 2022 - Present
35. Joules Provenzano, **PhD thesis committee**, advisor: Desirée Plata, MIT 2022 - Present
34. Pablo Dean, **PhD thesis committee**, advisor: Zachary P. Smith, MIT 2022 - Present
33. Jisoo Kim, **PhD thesis committee**, advisor: Kwanghun Chung, MIT 2022 - Present
32. Mary Agnes Joens, **PhD thesis committee**, advisor: Gareth McKinley and Patrick S. Doyle, MIT 2022 - Present
31. Pedro de Souza, **PhD thesis committee**, advisor: Martin Z. Bazant, MIT 2022
30. Jina Koh, **undergraduate student**, MIT 2024 - Present
29. Jennifer Espinoza Modonaldo, **undergraduate student**, MIT 2024 - Present
28. Nicole Johnston, **undergraduate student**, MIT 2024 - Present
27. Maeve McGinnis, **undergraduate student**, MIT 2024 - Present
26. Samantha Philips, **undergraduate student**, MIT 2024 - Present

25. Gabriela Wojcik, **undergraduate student**, MIT 2024 - Present
24. Michaela Sinclair, **undergraduate student**, Harvard 2024 - Present
23. Kevin Liu, **undergraduate student**, MIT 2022 - Present
22. Gabrielle L Moore, **undergraduate student**, MIT 2022 - 2024
21. Kathleen R Bailey, **undergraduate student**, MIT 2022 - 2024
    Current Position: PhD student, Stanford University
20. Yi Jun Yang, **undergraduate student**, MIT 2022 - 2024
    Current Position: Boston Consulting Group
19. Yan Zheng, **undergraduate student**, MIT 2022 - 2024
    Current Position: PhD student, Columbia University
18. Eunice Park, **research associate**, MIT 2023 - 2024
17. Joshua Martinez, **undergraduate student**, MIT 2024
16. Fiona Duong, **undergraduate student**, MIT 2022 - 2024
    Current Position: PhD student, UC Berkeley-UCSF bioengineering
15. Camryn Couvillion, **undergraduate student**, Texas A & M University 2022
14. Duha Syar, **undergraduate student**, MIT 2022 - 2023
    Current Position: PhD student, UC Berkeley
13. Krishnapriya Rajaram, **undergraduate student**, Wellesley College 2022
12. Jehan Ahmed, **undergraduate student**, MIT 2022
11. Jyotsna Nair, **undergraduate student**, MIT 2022
10. Andrew J Zhao, **undergraduate student**, MIT 2022
9. Vihar Trada, **undergraduate student**, University of Illinois Chicago 2022
8. Ananth Shyamal, **undergraduate student**, MIT 2022
7. Austin Chin, **undergraduate student**, MIT 2022
6. Joshua Placides, **High school student**, Oceanside High School East 2024
5. Nicola Knowles, **PhD rotation student**, MIT 2021 - 2022
   Project: a microphysiological system mimicking the blood-retinal barrier under dynamic conditions
4. Ninad Kumbhojkar, **PhD student**, Harvard University 2020 - 2021
   Project: blood-brain barrier chip for neutrophil-based drug delivery
3. Supriya Prakash, **PhD student**, Harvard University 2020 - 2021
   Project: blood-brain barrier chip for natural-killer-cell-based drug delivery
2. Kelly Luo, **undergraduate student**, Harvard University 2019 - 2020
   Current Position: Twitter, San Francisco, CA
   Project: hybrid ionic liquid drug delivery system for topical targeting to the epidermis

1. Miya Duffy, **undergraduate student**, Santa Clara University 2019
   Current Position: PhD student, MIT
   Project: spectroscopic analysis of ionic liquids on skin stratum corneum

FUNDING SOURCES

Koch Frontier Award, Massachusetts Institute of Technology
PI: Patrick Doyle
Co-PI: Qin M. Qi
Date: 5/31/2024-5/31/2025
Title: : PROTAC nano-templated hydrogel microparticles to enable membrane permeability and aqueous dissolution
Amount: Direct $50,000

MISTI Travel Award, Massachusetts Institute of Technology
PI: Qin M. Qi
Co-PI: Katherine Elvira
Date: 7/1/2024-1/31/2026
Title: : Understanding nanoparticle-induced changes in membrane permeability
Amount: Direct $25,000

CAREER Award, National Science Foundation
PI: Qin M. Qi
Date: 3/1/2024-3/1/2029
Title: : Design Principles of Deformable and Adhesive Particles in Multiphase Flow through Microchannels
Amount: Direct $405,201

Research Support Committee, Massachusetts Institute of Technology
PI: Qin M. Qi
Date: 7/1/2022-7/1/2024
Title: An in silico-in vitro model to accelerate the design and translation of erythrocyte-based targeted drug delivery carriers
Amount: Direct $75,000

Energy Initiative Seed Grant, Massachusetts Institute of Technology
PI: Qin M. Qi
Date: 7/1/2022-7/1/2025
Title: Aqueous Ionic Liquid Microstructures for Efficient Lipid Extraction in Microalgal Biofuel Production
Amount: Total $125,000

JOURNAL REVIEWER

Physical Review Letter, *Journal of Fluid Mechanics*, *ACS Biomaterials*, *Bioengineering and Translational Medicine*, *Physical Review Fluids*, *Physical Review Applied*, *Rheology Acta*, *Journal of Rheology*, *Biophysical Journal* 2015 - Present

SERVICE AND OUTREACH

19. Session Chair, Annual Meeting of ACS Colloids 2024

18. Diversity, Equity and Inclusions Committee Member, Department of Chemical Engineering, MIT 2023
17. Review Panelist, National Science Foundation 2022-present
16. Review Panelist, National Institute of Health 2022-present
15. Education Committee, Society of Rheology 2022-present
14. Area(1J) programming committee, American Institute of Chemical Engineers 2022-2027
13. Graduate and Postdoc Education Strategic Planning Committee Member, Department of Chemical Engineering, MIT 2022
12. Graduate Admissions Committee Member, Department of Chemical Engineering, MIT 2022
11. Mentor and Panel Discussion Moderator, Rising Star in ChemE, MIT 2022
10. Faculty Mentor, MIT Summer Research Program 2022
9. Session Chair, Annual Meeting of the Society of Rheology 2022
8. Session Chair, Annual Meeting of the American Institute of Chemical Engineers 2021, 2023
7. Presenter and volunteer, 3rd Annual Postdoc Research Symposium, Harvard University 2019
6. Presenter and volunteer, Postdoc Science Cafe, Harvard University 2019
5. Mentor, Chemical Engineering Student Committee, Stanford University 2014 - 2017
4. Judge, Undergraduate Research Symposium, Stanford University 2015
3. Mentor, Women in Science and Engineering, Stanford University 2014 - 2015
2. Volunteer, Annual Meeting of the American Physics Society Division of Fluid Dynamics 2014
1. Section leader, Chinese Students and Scholars Association, Cornell University 2010 - 2011