Kaiwen Hsiao

Postdoctoral Associate
Department of Chemical Engineering
Stanford University
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Education

2016 Ph. D. Chemical and Biomolecular Engineering
University of Illinois at Urbana-Champaign, Urbana, IL
Advisor: Professor Charles M. Schroeder
Dissertation title: *Single polymer dynamics of linear and architecturally complex chains in semi-dilute solutions*

2012 B. S. E. Chemical Engineering
National Taiwan University, Taipei, Taiwan

Research Appointments

2/2021 – present Postdoctoral Associate
Department of Chemical Engineering, DeSimone Group
Stanford University, Stanford, CA

8/2012 – 5/2017 Graduate Research Assistant
Department of Chemical and Biomolecular Engineering, Schroeder Group
University of Illinois at Urbana-Champaign, Urbana, IL

Work Appointments

12/2019 – 1/2021 Camera Product Image Quality Engineer, Camera Hardware
Apple Inc, Cupertino, CA

7/2017 – 10/2019 Optical Proximity Correction Design Engineer, RET team
Intel Inc, Hillsboro, OR

Awards and Honors

2022 Stanford Wu-Tsai Human Performance Fellow
2022 Stanford Bio-X Travel Award
2022 ACS PMSE Future Faculty Award
2021 Stanford Molecular Imaging Program (MIPS) poster presentation First Prize
2017 ChBE Graduate Symposium Presentation Second Prize
2016 – 2017 Spirit AeroSystems Fellow
2016 GLCACS Outstanding Student Research Award
2016 AIChE Selected presentation: Excellence in Graduate Polymer Research
2016 UIUC ChBE Spring Hanratty Travel Award
2015 UIUC Graduate College Spring Conference Travel Award
2015 Dow Company Graduate Fellowship
2014 Mavis Future Faculty Award
2014 UIUC ChBE Spring Hanratty Travel Award
2014 - 2016 Taiwan Study Abroad Student Fellowship
2014 Dow Company Graduate Fellowship

Peer Reviewed Publications

[13] **K. Hsiao***, A. Berman*, C. Xi, E. Stein, K. Nguyen, J. M. DeSimone, Z. Bao "Digitally, designed and fabricated miniature capacitive pressure sensors", *in prep. *equal contribution*

[12] N. U. Rajesh, I. Coates, M. Driskill, M. Dulay, **K. Hsiao**, D. Ilyin, G. Jacobson, J. Kwak, M. Lawrence, J. Perry; C. Shea, S. Tian, J. M. DeSimone "3D-printed Micro-Array Patches (MAPs) for Transdermal Applications", *accepted at JACS Au (2022)*

[11] **K. Hsiao***, B. J. Lee*, T. Samuelsen, G. Lipkowitz, D. Ilyn, A. Shih, M. T. Dulay, L. Tate, E. S. Shaqfeh, *Joseph M. DeSimone "Single Digit micron high-resolution CLIP", *accepted at Science Advances (2022)*

[10] G. Lipkowitz, T. Samuelsen, **K. Hsiao**, B. J. Lee, I. Coats, W. Pan, H. Lin, G. Toth, M. T. Dulay, L. Tate, E. S. Shaqfeh, *Joseph M. DeSimone. "Vat injection additive manufacturing through spatioselectively-programmable microfluidic ducts", Science Advances, 8 (39), (2022).

[9] **K. Hsiao***, B. J. Lee*, G. Lipkowitz, T. Samuelsen, J. M. DeSimone "Characterization of a 30 micron pixel size CLIP-based 3D printer and its enhancement through dynamic printing optimization", Additive Manufacturing, 55, 102800, (2022) *equal contribution*

[8] Y. Zhou, **K. Hsiao**, K. E. Regan, D. Kong, G. B. Mckenna, R. M. Robertson-Anderson, C. M. Schroeder "Effect of molecular architecture on ring polymer dynamics in semidilute linear polymer solutions", Nature Communications, 10(1), pp 1753, (2019).

[7] **K. Hsiao**, C. Sasmal, R. Prakash, C. M. Schroeder. "Direct observation of DNA dynamics in semidilute solutions in extensional flow", Journal of Rheology, 61, pp 151-167 (2017). *Chosen to be Cover Art*.

[6] **K. Hsiao**, J. Dinic, Y. Ren, V. Sharma, C. M Schroeder. "Passive non-linear microrheology for determining extensional viscosity" Physics of Fluids, 29(12), pp 121603 (2017)

[5] C. Sasmal, **K. Hsiao**, C. M. Schroeder, R. Prakash. "Parameter-free prediction of DNA dynamics in planar extensional ow of semidilute solutions", Journal of Rheology, 61, pp 169-186 (2017)

[4] **K. Hsiao**, C. M. Schroeder, C. E. Sing "Ring polymer dynamics are governed by a coupling between architecture and hydrodynamic interactions" Macromolecules, 49(5), pp1961-1971 (2016)

[3] Y. Li, **K. Hsiao**, C. A. Brockman, D. Y. Yates, G. B. McKenna, C. M. Schroeder, M. J. San Francisco, J. A. Kornfeld, R. M. Anderson. "When Ends Meet: Circular DNA Stretches Differently in Elongational Flows" Macromolecules, 48(16), pp 5997-6001, (2015)

[2] F. Latinwo, **K. Hsiao**, C. M Schroeder "Nonequilibrium thermodynamics of dilute polymer solutions in flow" The Journal of chemical physics, 141(17), pp 174903 (2014)

[1] M. Wu, H. Hsu, **K. Hsiao**, C. Hsieh, H. Chen, "Vapor-Deposited Parylene Photoresist: A Multipotent Approach toward Chemically and Topographically Designed Biointerfaces". Langmuir, 28, 14313-14322, (2012).

Patent and Disclosures

[2] J. M. DeSimone, M. T. Dulay, G. Jacobson, D. Ilyin, **K. Hsiao**, N. Rajesh, C. Shea, J. Kwak, M. Lawrence, O. Ajao, M. Driskill, "Dynamic, 3D-printed microarray patches and related structures with compliant mechanisms." Ref: 63/333655

[1] J. M. DeSimone, J. Lee, **K. Hsiao**, J. Perry, S. Tian, N. Rajesh, A. Shih, G. Jacobson, M. Dulay "3D printed lattice microneedle for therapeutic, drug and vaccine delivery and liquid sampling, including interstitial fluids", Ref: 63/248280

Proposal Experience

[4] "Flow assembled 3D printed conjugated polyelectrolytes for bioelectronics", Boroughs Wellcome Fund – Career Awards at the Scientific Interface (CASI) (*Letter of Intent Submitted)*

[3] "Wearable electronics pressure sensor using high-resolution 3D CLIP", Stanford Wu Tsai Human Performance Alliance Agility Project Grants, May 2022, *Lead writer and postdoctoral researcher*

[2] "Solid-State RNA-based Products Delivered by 3D-printed Microneedle Patches", Wellcome Leap, Aug 13 2021, *Participated in proposal writing)*

[1] "High resolution integration for 3D MOSAIC using 3D CLIP technology", Stanford Precourt for Energy Efficient Computing, Jul 23 2021, *Participated in proposal writing*

Invited Talks

11/2022 Stanford University, Wu Tsai Performance Alliance and eWEAR

8/2022 University of Illinois Urbana Champaign, Department of Chemical and Biomolecular Engineering

5/2022 Stanford University, SystemX 2022 Spring Workshop, Energy Efficient Computing

1/2022 Stanford University, Department of Chemical Engineering (Shaqfeh lab)

3/2022 ACS E.V. Murphee Award in Industrial and Engineering Chemistry in honor of Joseph DeSimone

10/2021 Stanford SPC Lunch & Learn Seminar Autumn Quarter

9/2021 Stanford Ginzton Seminar for Applied Physics 483, Optics & Electronics Seminar

8/2021 Stanford University, Department of Chemical Engineering (Shaqfeh lab)

4/2021 Stanford University, SUPR Optical Society Annual presentation, "Development of high-resolution 3D CLIP"

2/2016 University of Illinois at Urbana-Champaign, Department of Mechanical Engineering Fluid Mechanics] Seminar Series, "*Single polymer dynamics of linear chains in semi-dilute polymer solutions*"

4/2015 University of Illinois at Urbana-Champaign, Research Live

Contributed Presentations

[26] A. Berman (speaker), **K. Hsiao**, C. Xu, E. Stein, K. Nguyen, J. M. DeSimone, Z. Bao. "Flexible capacitive pressure sensors with 3D printed lattice dielectric layers", MRS. Fall 2022

[25] **K. Hsiao** (speaker), B. J. Lee, A. Shih, G. Lipkowitz, T. Samuelson, J. M. DeSimone. "Single-digit micron resolution 3D CLIP printer for wearable electronics", Stanford eWear Symposium. Sept 2022.

[24] D. Ilyin (speaker), **K. Hsiao**, R. Radway, J. Kwon, T. Samuelson, S. Mitra, J. M. DeSimone. "Production of microelectronic devices via high-resolution CLIP", Additive Manufacturing GRC. Aug 2022.

[23] E. Stein (speaker), **K. Hsiao**, C. Xu, K. Nguyen, Z. Bao, J. M. DeSimone. "3D printing lattice based capacitive pressure sensors for human health and performance monitoring", Additive Manufacturing GRC. Aug 2022.

[22] N. U. Rajesh, **K. Hsiao**, M. T. Dulay, G. Jacobson, J. M. DeSimone. "3D-printed lattice micro-array patches (L-MAPs) for transdermal RNA delivery", Additive Manufacturing GRC. Aug 2022.

[21] **K. Hsiao** (speaker), B. J. Lee, A. Shih, G. Lipkowitz, T. Samuelson, J. M. DeSimone. "Single-digit micron resolution 3D CLIP printer for wearable electronics", Additive Manufacturing GRC. Aug 2022.

[20] B. J. Lee (speaker), **K. Hsiao**, A. Shih, G. Lipkowitz, T. Samuelson. J. M. DeSimone. "Single-digit-micron resolution continuous liquid interface production (CLIP) 3D print technology", International Conference on Precision Engineering and Sustainable Manufacturing, PRESM, 2022

[19] **K. Hsiao** (speaker), B. J. Lee, A. Shih, G. Lipkowitz, T. Samuelson, J. M. DeSimone. "High-Resolution 3D Continuous Liquid Interface Printing", ACS. Spring 2022. (Invited Talks)

[18] **E. Stein** (speaker), K. Hsiao, J. DeSimone. "3D Printing Capacitive Pressure Sensors for Medical Devices". Symposium of Undergraduate Research & Public Service (SURPS), 2021, Oct.

[17] **K. Hsiao** (speaker), B. J. Lee, A. Shih, G. Lipkowitz, T. Samuelson, J. M. DeSimone. "High-Resolution 3D Continuous Liquid Interface Printing", Stanford, MIPS Retreat, 2021. Poster Award and Audience Award 1st Prize

[16] C. Sasmal, **K. Hsiao**, C. M. Schroeder, R. Prakash. "Parameter-free prediction of DNA dynamics in planar extensional flow of semidilute solutions: A single molecule study", ICR 2016.

[15] **K. Hsiao** (speaker), Y. Li, G. B. MeKenna, C. M. Schroeder. "Single polymer dynamics of linear and architecturally complex chains in semi-dilute solutions", American Physical Society March Meeting. Baltimore, MD, March 2016. Awarded Spring 2016 Conference Travel Award

[14] **K. Hsiao** (speaker), C. M. Schroeder. "Single polymer dynamics of linear and architecturally complex chains in semi-dilute solutions", GLCACS. Chicago, IL, May 2016. Awarded Outstanding Student Presentation Award

[13] **K. Hsiao**(speaker), C. M. Schroeder "Single Polymer Dynamics of Linear and Circular Chains in Semi-Dilute Solutions", AICHE. San Francisco, CA, Nov 2016. Excellence in Graduate Polymer Research (Invited Talks)

[12] **K. Hsiao** (speaker), C. M. Schroeder "Single Polymer Dynamics of Linear and Circular Chains in Semi-Dilute Solutions", AICHE. San Francisco, CA, Nov 2016. Awarded Outstanding Student Presentation Award 2nd Prize

[11] **K. Hsiao** (speaker), C. M. Schroeder. *Research Live* Three-minute talk presentation 2015 UIUC.

[10] **K. Hsiao** (speaker), Y. Li, G. B. MeKenna, C. M. Schroeder. "Linear and Circular DNA Dynamics in Semi-Dilute solutions", University of Illinois at Urbana Champaign, ChBE Annual Graduate Student Symposium. Poster Presentation. Urbana, IL, October 2015.

[9] **K. Hsiao** (speaker), Y. Li, G. B. MeKenna, C. M. Schroeder. "Linear and Circular DNA Dynamics in Semi-Dilute solutions", Society of Rheology 87th Annual Meeting.

[8] C. Sasmal, **K. Hsiao**, C. M. Schroeder, Ravi Prakash. "Parameter-free prediction of DNA dynamics in planar extensional ow of semidilute solutions", Society of Rheology 87th Annual Meeting.

[7] Y. Li (speaker), C. A. Brockman, D. Y. Yates, **K. Hsiao**, G. B. Mckenna, C. M. Schroeder, M. J. San Francisco, J. A. Kornfeld, R. M. Anderson. "Comparison of the single molecular dynamics of linear and circular DNAs in microfluidic planar extensional flows", Society of Rheology 86th Annual Meeting.

[6] Y. Li (speaker), **K. Hsiao**, C. A. Brockman, D. Y. Yates, G. B. McKenna, C. M. Schroeder, M. J. San Francisco, J. A. Kornfeld, R. M. Anderson. "Comparison of the Single Molecule Dynamics of Linear and Circular DNAs in Planar Extensional Flows", American Physical Society March Meeting. San Antonio, TA, March 2015.

[5] **K. Hsiao** (speaker), C. Brockmen, and C. M. Schroeder. "Direct observation of polymer dynamics in semi-dilute solutions", American Physical Society March Meeting. San Antonio, TA, March 2015. Awarded Spring 2015 Conference Travel Award

[4] **K. Hsiao** (speaker), C. A. Brockmen, and C. M. Schroeder. "Polymer Relaxation and Stretching Dynamics in Semi-dilute DNA Solutions: A Single Molecule Study", University of Illinois at Urbana Champaign, ChBE Annual Graduate Student Symposium. Poster Presentation. Urbana, IL, October 2014.

[3] Y. Li (speaker), C. A. Brockman, D. Y. Yates, **K. Hsiao**, Gregory B. Mckenna, C. M. Schroeder, M. J. San Francisco, J. A. Kornfeld, R. M. Anderson. "Comparison of the Single Molecular Dynamics of Linear and Circular DNAs in Microfluidic Planar Extensional Flows", 2014 AICHE Annual Meeting

[2] **K. Hsiao** (speaker), C. A. Brockmen, and C. M. Schroeder. "Direct observation of polymer dynamics in semi-dilute solutions", American Physical Society March Meeting. Denver, CO, March 2014. Awarded Spring 2014 Hanratty Travel Award

[1] **K. Hsiao** (speaker), C. A. Brockmen, and C. M. Schroeder. "Polymer Relaxation and Stretching Dynamics in Semi-dilute DNA Solutions: A Single Molecule Study", Society of Rheology 86th Annual Meeting. Poster Presentation. Philadelphia, PA, October 2014.

Service to the Science Community

[4] Session Chair, ACS BIOT symposium (2023)

[3] Session Chair, ACS E.V. Murphee Award in Industrial and Engineering Chemistry, in honor of Joseph M. DeSimone (2022)

[2] Session Chair, APSDPOLY VSPP, Dynamics and Interfacial Phenomena of Polymers (2021)

[1] Manuscript peer review: *Science Advances, Cell Reports Medicine, iScience, 3D Printing and Additive Manufacturing*

Teaching Experience

2016 **Teaching Assistant** Advanced Heat and Mass Transfer (ChBE 523), Graduate Required Course. University of Illinois. Spring (Jan-Apr).

2015 **Teaching Assistant** Advanced Fluid Dynamics (ChBE 522), Graduate Elective Course. University of Illinois. Spring (Jan-Apr).

2014 **Teaching Assistant** Momentum and Heat Transfer (ChBE 421), Undergraduate Required Course. University of Illinois. Fall (Aug-Dec).

Trainees

[2] **Undergraduate Researcher**

Illinois: Yi Ren, Chemical and Biomolecular Engineering

Stanford: Emily Carolyn Miller Stein, Material Science and Engineering

Stanford: Khuyen Thi Hoang Nguyen, Mechanical Engineering

Stanford: Daniela Figueroa, Chemical and Biomolecular Engineering

Foothill College: Tosif Aliyev, Engineering

[1] **Graduate Researcher**

Stanford: Audrey Shih, Chemical and Biomolecular Engineering

Stanford: Genni Licardo, Chemical and Biomolecular Engineering

Stanford: Dan Ilyin, Mechanical Engineering

Affiliations and Outreach

2022 – 2023 **Postdoctoral Liaison** Stanford Polymer Collective (SPC)
2021 – 2022 **Moderator** Stanford Rainstorm (Splash program)
2021 – 2022 **Mentor** Foothill College Science Learning Institute (SLI) STEM micro-internships
2019 – 2020 **Member** Apple Asian American Society communication lead candidate
2017 – 2019 **Member** Women in Intel Career development workshop
2018 – 2019 **Volunteers** Hillsboro Brookwood Public Library weekend volunteer
2015 – 2016 **Members** University of Illinois Orange and Blue Engagement
2013 **Committee** University of Illinois ChBE Graduate Symposium Planning Committee
2010 – 2011 **President** NTU Chemical Engineering Student Welfare Organization
2010 – 2011 **President** NTU Service for Children with Cancer. NTU and Mackay Memorial hospital
2008 – 2010 **Staff** NTU Chemical Engineering. Recruiting prospective high-school students
2008 **Tutor** Zhong-Shan Girl's Senior High-school