Pengfei Zhang

Department of Chemical and Biological Engineering, Princeton University, thuzpf09@gmail.com

EDUCATION

Johns Hopkins University (Baltimore, MD) 2016 – 2022
Ph.D., Biomedical Engineering
Thesis Title: *Development of A Cascaded High-throughput Droplet Microfluidic Platform for Scalable Single-cell/Single-molecule Analysis*
Advisor: Jeff Wang, Ph.D.

Tsinghua University (Beijing, China) 2013 – 2016
M.S., Biomedical Engineering
Thesis Title: *The Development of a Superhydrophobic Microwell Chip for High-Throughput Cellular Assays*
Advisor: Peng Liu, Ph.D.

Tsinghua University (Beijing, China) 2009 – 2013
B.S. Chemistry

RESEARCH EXPERIENCES

Princeton University (PBI2 Fellow) 2022 -
Advisor: Celeste Nelson, Ph.D. and Michelle Chan, Ph.D. (Department of Chemical & Biological Engineering and Department of Molecular Biology)

- *Studying the spatially transcriptomic-level gene expression during embryonic lung development, with a special focus on mesenchymal function in lung branching*
- *Designing and optimizing lineage tracing of mesenchymal differentiation during embryonic development using spatial transcriptomics and molecular recorder*

Johns Hopkins University (Graduate Research Assistant) 2016 – 2022
Advisor: Jeff Wang, Ph.D. (Mechanical Engineering & Biomedical Engineering Depts)

- *Designing and validating a cascaded single-cell droplet microfluidic platform*
- *Scaling up rapid antibiotic susceptibility testing for urinary tract infections*
- *Developing highly-sensitive protein detection methods using immuno-PCR/PEA-PCR*

Tsinghua University (Graduate Research Assistant) 2013 – 2016
Advisor: Peng Liu, Ph.D. (Department of Biomedical Engineering)

- *Developing a novel superhydrophobic microwell array chip (SMARchip)*
- *Probing the individual/combinatorial effect of soluble factors, extracellular matrices and biophysical cues on stem cell fates in a high-throughput manner*

Indiana University (Summer Undergraduate Research Assistant) 2012 – 2012
Advisor: Dongwhan Lee, Ph.D. (Department of Chemistry)

- *Designing and validating a synthetic route for tris(benzotriazole)s*

Tsinghua University (Undergraduate Research Assistant) 2010 – 2012
Advisor: Gaoquan Shi, Ph.D. (Department of Chemistry)

- *Assisting in the synthesis of graphene oxide/conducting polymer composite hydrogel*

SELECTED HONORS AND AWARDS

The Princeton Bioengineering Initiative - Innovators (PBI2) Distinguished Postdoctoral Scholars 2021

National Human Genome Research Institute Stipend, Cold Spring Harbor Laboratory Advanced Sequencing Technologies and Bioinformatics Analysis Course 2020

Travel Grant Recipient at the 23rd microTAS Conference, Basel, Switzerland 2019

First Place, Institute for Nanobiotechnology Student Research Forum Pitch Competition 2019

Gold Star Award for Excellent Academic Achievement at Tsinghua University, Beijing 2016

Outstanding Graduate at Tsinghua University, Beijing 2013

National Scholarship at Tsinghua University, Beijing 2012

Haodushu Scholarship at Tsinghua University, Beijing 2011

Wangwang Scholarship at Tsinghua University, Beijing 2010

PUBLICATIONS

Peer-Reviewed Journal Articles (* Denotes equal author contribution)

1. Goodwin, K., Lemma, B., **Zhang, P.,** Boukind, A., & Nelson, C. M., 2023. Plasticity in airway smooth muscle differentiation during mouse lung development. ***Developmental Cell***, 58, 338-347.
2. **Zhang, P.,** & Chan, M. M., 2022. A multifaceted signal recorder of cellular experiences using Cas12a base-editing. ***Trends in Biotechnology.***
3. **Zhang, P.*,** Hu J.*, Park, J. S., Hsieh, K., Chen, L., Mao, A., & Wang, T. H., 2022. Highly Sensitive Serum Protein Analysis Using Magnetic Bead-Based Proximity Extension Assay. ***Analytical Chemistry***, 94(36), 12481-12489.
4. **Zhang, P,** Kaushik, A., Hsieh, K., Li, S., Lewis, S., Mach, K. E., Liao, J. C., Carroll, K. C., and Wang, T.-H., 2021. A Cascaded Droplet Microfluidic Platform Enables High-throughput Single Cell Antibiotic Susceptibility Testing at Scale. ***Small Methods***, 6(1), 2101254.
5. **Zhang, P,** Chen, L., Hu, J., Trick, A., Chen, F. E., Hsieh K., Zhao, Y., Coleman, B., Kruczynski, K., Heaney, C. D., Clarke, B., and Wang, T.H., 2022. Magnetofluidic immuno-PCR for point-of-care COVID-19 serological testing. ***Biosensors and Bioelectronics***, 195, 113656.
6. **Zhang, P*,** Kaushik, A.*, Mach, K.E.*, Hsieh K., Liao, J. C., and Wang, T.H. 2021. Facile syringe filter-enabled bacteria separation, enrichment, and buffer exchange for clinical isolation-free digital detection and characterization of bacterial pathogens in urine. ***Analyst,*** 146(8), 2475-2483.
7. Hsieh, K.*, Mach, K.*, **Zhang, P.***, Liao, J., and Wang, T.-H., 2021. Combating Antimicrobial Resistance via Single-Cell Diagnostic Technologies Powered by Droplet Microfluidics, ***Accounts of Chemical Research***, 55(2), 123-133.
8. Zhang, Y.*, **Zhang, P.***, Chen, L., Kaushik, A., Hu, K. and Wang, T.H., 2020. ddRFC: A scalable multiplexed droplet digital nucleic acid amplification test platform. ***Biosensors and Bioelectronics***, 167, 112499.
9. **Zhang, P.***, Kaushik, A.*, Hsieh, K.* and Wang, T.H., 2019. Customizing droplet contents and dynamic ranges via integrated programmable picodroplet assembler. ***Microsystems & Nanoengineering***, 5(1), 22.
10. **Zhang, P.** *, Zhang, J. *, Bian, S., Chen, Z., Hu, Y., Hu, R., Li, J., Cheng, Y., Zhang, X., Zhou, Y. and Chen, X., 2016. High-throughput superhydrophobic microwell arrays for investigating multifactorial stem cell niches. ***Lab on a Chip***, 16(16), 2996-3006.
11. Li, H., **Zhang, P.**, Hsieh, K., and Wang, T. H., 2022. Combinatorial nanodroplet platform for screening antibiotic combinations. ***Lab on a Chip***.
12. Shao, F., Hsieh, K., **Zhang, P.**, Kaushik, A., and Wang, T. H., 2022. Facile Tubing-Free Sample Loading for Droplet Microfluidics. ***Scientific Reports,*** 12(1), 1-12.
13. Li, S., Hu, Y., Li, A., Lin, J., Hsieh, K., **Zhang, P.**, Zhu, Y., Wang, T. H., and Mao, H. Q., 2022. Payload Distribution and Capacity of mRNA Lipid Nanoparticles. ***Nature Communications,*** 13(1), 1-13.
14. Hu, J., Chen, L., **Zhang, P.**, Hsieh, K., Li, H., Yang, S., & Wang, T. H., 2021. A vacuum-assisted, highly parallelized microfluidic array for performing multi-step digital assays. ***Lab on a Chip***, 21(23), 4716-4724.

15. Chen, F. E., Kaushik, A., Hsieh, K., Chang, E., Chen, L., **Zhang, P.**, & Wang, T. H., 2020. Toward Decentralizing Antibiotic Susceptibility Testing via Ready-to-Use Microwell Array and Resazurin-Aided Colorimetric Readout. ***Analytical Chemistry***, *93*(3), 1260-1265.
16. Surrette, C., Scherer, B., Corwin, A., Grossmann, G., Kaushik, A.M., Hsieh, K., **Zhang, P.**, Liao, J.C., Wong, P.K., Wang, T.H. and Puleo, C.M., 2018. Rapid microbiology screening in pharmaceutical workflows. ***SLAS TECHNOLOGY: Translating Life Sciences Innovation***, 23(4), 387-394.
17. Song, J., Dailey, J., Li, H., Jang, H.J., Russell, L., **Zhang, P.**, Searson, P.C., Wang, J.T.H., Everett, A.D. and Katz, H.E., 2018. Influence of bioreceptor layer structure on myelin basic protein detection using organic field effect transistor-based biosensors. ***Advanced Functional Materials***, 28(37), 1802605.
18. Song, J., Dailey, J., Li, H., Jang, H.J., **Zhang, P.**, Wang, J.T.H., Everett, A.D. and Katz, H.E., 2017. Extended solution gate OFET-based biosensor for label-free glial fibrillary acidic protein detection with polyethylene glycol-containing bioreceptor layer. ***Advanced Functional Materials,*** 27(20), 1606506.
19. Gan, W., Zhuang, B., **Zhang, P.**, Han, J., Li, C.X. and Liu, P., 2014. A filter paper-based microdevice for low-cost, rapid, and automated DNA extraction and amplification from diverse sample types. ***Lab on a Chip***, 14(19), pp.3719-3728.
20. Bai, H., Sheng, K., **Zhang, P.**, Li, C. and Shi, G., 2011. Graphene oxide/conducting polymer composite hydrogels. ***Journal of Materials Chemistry***, 21(46), pp.18653-18658.

INTELLECTUAL PROPERTIES

United States Patent Application

1. "Methods and compositions for single cell analysis," Inventors: Bell, C., Zack, D., Wang, T. H., Kaushik, A. and **Zhang, P.**; Patent Application Number: 63/065,4336

Invention Disclosure

1. "Automated Tubing-Free Sample-to-Droplet Interface for Microfluidic Droplet Technologies toward High-Throughput Screening Applications" Inventors: Wang, T. H., Hsieh, K., Fan, Y. F., Kaushik, A., Shao, F., **Zhang, P.**; JHU Reference Number: C16114

Chinese Patent

1. "A method for fabricating high-throughput superhydrophobic microwell and its application," Inventors: Liu, P., **Zhang, P.**, Zhang, J., Bian, S., Cheng, Y.; Patent Number: CN105861309, PCT/CN2017/078946

SELECTED PRESENTATIONS

Conference Oral Presentations

1. Bell, C., Fang, W., Berlinicke, C., Kaushik, A., **Zhang, P.**, Wang, T.H., Kalhor, R., Ji, H. and Zack, D.J., 2020. Single-cell lineage tracing of developing retinal systems. Investigative Ophthalmology & Visual Science, 61(7), pp.4014-4014.
2. **Zhang, P.**, Kaushik, A., Hsieh, K. and Wang, T.H., 2020. "DropPNA-GO: A Single-cell Uropathogen Sensor Based on PNA Probes and Graphene Oxide in Picoliter Droplets." The 15th IEEE International Conference on Nano/Micro Engineered & Molecular Systems (IEEE-NEMS 2020), San Diego
3. **Zhang, P.**, Kaushik, A., Hsieh, K. and Wang, T.H., 2019. "Multiplex droplet platform for rapid single-cell antibiogram." The 23rd International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS 2019), Basel, Switzerland
4. **Zhang, P.**, Kaushik, A., Hsieh, K. and Wang, T.H., 2018. Integrated droplet generation and assembly platform with precisely controlled droplet contents and uniform droplet incubation duration. The 22nd International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS 2018), Kaohsuing, Taiwan

Conference Poster Presentations (* Denotes equal author contribution)

1. **Zhang, P,** Chen, L., Hu, J., Trick, A., Chen, F.E., Hsieh, K., Zhao, Y., and Wang, T.H., 2021. A highly sensitive point-of-care COVID-19 serological test using immuno-PCR in 35 mins. In 2021 21st International Conference on Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS, 2021)
2. **Zhang, P.**, Zhang, Y. and Wang, T.H., 2019. Multiplex digital isothermal amplification and detection of nucleic acids. BMES 2019 Annual Meeting, Philadelphia, PA, USA
3. Zhang, Y.*, **Zhang, P.*** and Wang, T.H., 2019. Droplet-based digital ratiometric fluorescence coding for multiplex nucleic acid amplification testing. The 32nd IEEE International Conference on Micro Electro Mechanical Systems (MEMS 2019), Seoul, South Korea
4. **Zhang, P.**, Kaushik, A., Hsieh, K. and Wang, T.H., 2017. Generation of picoliter droplets from in situ assembled nanoliter plugs for multiple high throughput assays on a single device. The 21st International Conference on Miniaturized Systems for Chemistry and Life Sciences (MicroTAS 2017), Savannah, GA, USA
5. **Zhang, P.**, Kaushik, A., Hsieh, K. and Wang, T.H., 2017, June. Spatially encoded picoliter droplet groups for high-throughput combinatorial analysis. In 2017 19th International Conference on Solid-State Sensors, Actuators and Microsystems (TRANSDUCERS, 2017), Kaohsuing, Taiwan

TEACHING EXPERIENCES

Johns Hopkins University

Teaching Assistant, BioMEMS (Undergraduate Upper Level)	Spring 2020
Teaching Assistant, Cellular & Tissue Engineering Lab (Undergraduate Upper Level)	Spring 2020
Teaching Assistant, Cellular Engineering (Undergraduate Upper Level)	Fall 2018

SERVICE ACTIVITIES

Journal Manuscript Reviews

Journal of Advanced Research, Biosensors and Bioelectronics, Microsystems and Nanoengineering, *Analyst, IEEE Transactions on Nanotechnology and Journal of Virological Methods*

Educational Outreach

Mentor – STEM Achievement in Baltimore Elementary Schools (SABES)	2016 – 2017
Mentor – One More One Less (OMOL) STEM Program	2016 – 2017

Community Services

Volunteer – Johns Hopkins University President's Day of Service	2019
Volunteer – Johns Hopkins University President's Day of Service	2017