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## BIOGRAPHICAL SKETCH

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NAME: Liu, Pei

eRA COMMONS USER NAME: PEI.LIU

POSITION TITLE: Postdoctoral Researcher

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### EDUCATION/TRAINING

INSTITUTION AND LOCATION	DEGREE (if applicable)	START DATE MM/YYYY	END DATE MM/YYYY	FIELD OF STUDY
Mount Holyoke College	BA	09/2010	05/2013	Biochemistry
UC Berkeley	PHD	08/2014	08/2019	Chemistry
Stanford University		09/2019	present	Synthetic Biology

### A. Personal Statement

My research interests focus on developing novel chemical biology and bioengineering tools to gain deeper understanding of various biological pathways, with a long-term goal to provide more insights into both basic and applied research. In particular, I would like to apply new and safer tools to elucidate mechanisms and offer potential solutions in pediatric cancers to advance children healthcare. My background in chemical biology with extensive training in the chemistry-biology interface has equipped me with a diverse range of skills from molecular biology, cell culture, organic synthesis to animal work. For my one-year post-graduate research, I studied small molecule glycomimetics and identified a few scaffolds that enhance neuronal signaling. I published one first-author paper during the year and co-authored another later. My PhD work has focused on designing novel strategies to genetically target small molecule dyes in defined neurons for high-contrast imaging. I have made major contributions in demonstrating the cell-specific labeling of voltage sensitive dyes in mouse brain slice and live mice to study neuronal activity. I also worked on using a new photocage scaffold to achieve light-dependent activation of desired biological processes. Both projects were highly collaborative and interdisciplinary. I was the first-author in two research papers and one review article and co-authored several others, all which were published in major journals. The pursuit of both my undergraduate and graduate careers was supported by the prestigious A\*STAR scholarship from Singapore and I have also received several academic awards. My current postdoctoral research involves exploring the possibility of using ultrasound as a stimulus for gene expression control with potential applications in CAR T cells and cancer models. This project will build upon my previous training and further expand my skill set in the field of synthetic biology and ultrasound application. The training also involves other career development activities such as grant writing, which will provide solid foundations and valuable experiences to becoming an independent investigator.

1. Deal PE\*, **Liu P\***, Al-Abdullatif SH, Muller VR, Shamardani K, Adesnik H, Miller EW. Covalently tethered rhodamine voltage reporters for high speed functional imaging in brain tissue. *J Am Chem Soc.* 2020; 142(1): 614-622. (\*Co-first authors)
2. **Liu P**, Miller EW. Electrophysiology, unplugged: imaging membrane potential with fluorescent indicators. *Acc Chem Res.* 2020; 53 (1): 11-19.
3. **Liu P**, Grenier V, Hong W, Muller VR, Miller EW. Fluorogenic targeting of voltage-sensitive dyes to neurons. *J Am Chem Soc.* 2017; 139: 17334-17340.

## B. Positions and Honors

### Positions and Employment

- 2013 - 2014    Lab Officer, Institute of Bioengineering and Nanotechnology, A\*STAR, Singapore
- 2019 -        Postdoctoral Researcher, Stanford University

### Honors

- 2010 - 2013    National Science Scholarship (BS), A\*STAR, Singapore
- 2010 - 2013    Chairman's Honors List, A\*STAR, Singapore
- 2011 - 2012    Bernice MacLean Award for Excellence in Biological Sciences, Mount Holyoke
- 2012            Abby Howe Turner Award for Excellence in Biological Sciences, Mount Holyoke
- 2012            Louisa Stone Stephenson Prizes for Excellence in Chemistry, Mount Holyoke
- 2013            Edna H Graham'41 Prize, Mount Holyoke
- 2013            Roll of Honors, A\*STAR, Singapore
- 2014 – 2019    National Science Scholarship (PhD), A\*STAR, Singapore
- 2016            Awarded for Best Poster Presentation, ICBS – Madison, Wisconsin

## C. Contribution to Science

1. **Early Career:** My early career research involved skill development including organic synthesis, mammalian cell culture and various biochemical assays such as western blotting and immunostaining. More specifically, I worked as a lab officer in the Institute of Bioengineering and Nanotechnology (A\*STAR, Singapore) where I learned and applied abovementioned techniques to design and study small molecule mimetics of glycosaminoglycans. In particular, I focused on evaluating the biological effect of these glycomimetics in cultured cells and identified a few interesting scaffolds that enhance neuronal signaling and neurogenesis.
  - a. **Liu P\***, Chen L\*, Toh JKC, Ang YL, Jee J-E, Lim J, Lee SS, Lee S-G. Tailored chondroitin Sulfate glycomimetics via a tunable multivalent scaffold for potentiating NGF/TrkA-induced neurogenesis. *Chem Sci.* 2015; 6: 450-456. (\*Co-first authors)
  - b. Cai S, Lukamto DH, Toh JKC, Huber RG, Bong PJ, Jee J-E, Lim TC, **Liu P**, Chen L, Qu VQ, Lee SS, Lee S-G. Directing GDNF-mediated neuronal signaling with proactively programmable cell-surface saccharide-free heparan sulfate mimetics. *Chem Commun.* 2019; 55(9): 1259-1262.
2. **Graduate Career:** During my graduate studies, I focused my research on developing strategies to genetically target voltage sensitive dyes to specific cells as well as investigating the biological function of a novel BODIPY-based photocage. Both involved extensive fluorescence imaging experiments in which I validated and designed new tools

to study various biological phenomena such as membrane potential and calcium concentration changes in neurons. Besides demonstrations in cultured neurons, I also made major contributions to advance the use of targeted voltage sensitive dye in mouse brain slices and in live mice. These results provided key foundations to expand the application of voltage sensitive dye in the field of neuroscience.

- a. Kand D, **Liu P**, Navarro MX, Fischer LJ, Rousso-Noori L, Friedmann-Morvinski D, Winter AH, Miller EW, Weinstain R. Water-soluble BODIPY photocages with tunable cellular localization. *J Am Chem Soc.* 2020; 142 (11): 4970-4974.
  - b. Deal PE\*, **Liu P\***, Al-Abdullatif SH, Muller VR, Shamardani K, Adesnik H, Miller EW. Covalently tethered rhodamine voltage reporters for high speed functional imaging in brain tissue. *J Am Chem Soc.* 2020; 142(1): 614-622. (\*Co-first authors)
  - c. **Liu P**, Miller EW. Electrophysiology, unplugged: imaging membrane potential with fluorescent indicators. *Acc Chem Res.* 2020; 53 (1): 11-19.
  - d. Ortiz G, **Liu P**, Naing SHH, Muller VR, Miller EW. Synthesis of sulfonated carbofluoresceins for voltage imaging, *J Am Chem Soc.* 2019; 141(16): 6621-6638
  - e. **Liu P**, Grenier V, Hong W, Muller VR, Miller EW. Fluorogenic targeting of voltage-sensitive dyes to neurons. *J Am Chem Soc.* 2017; 139: 17334-17340.
  - f. Rubinstein N, **Liu P**, Miller EW, Weinstain R. Meso-methylhydroxy BODIPY: a scaffold for photo-labile protecting groups. *Chem Commun.* 2015; 51: 6369-6372.
3. **Postdoctoral Career:** My current postdoctoral research aims to explore the possibility of using ultrasound as a stimulus for gene expression control. Ultrasound has been extensively utilized in the clinical setting as a diagnostic and therapeutic tool due to its safety and low cost. However, there has been little research on combining ultrasound with gene therapy in which ultrasound can potentially manipulate gene expression and ultimately affect biological and cellular behavior. My projects focus on exploiting the mechanical and heat effect of ultrasound and designing a pathway using synthetic biology to realize the goal of ultrasound-mediated gene manipulation. I would like apply this new strategy in CAR T immunotherapy and in cancer models such as B-cell acute lymphoblastic leukemia.

Complete List of Published Work in My Bibliography:

<https://www.ncbi.nlm.nih.gov/myncbi/1rmm2DmlQpd9Lm/bibliography/public/>

## D. Additional Information: Research Support and/or Scholastic Performance

### Scholastic Performance

YEAR	COURSE TITLE	GRADE
	UC BERKELEY	
2014	Physical Organic Chemistry	A
2015	Chemical Biology	A