

GARY W. LIU

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EDUCATION

University of Washington

Ph.D. in Bioengineering, specialization in Molecular and Cellular Engineering
Thesis | Engineering multiscale therapeutics for kidney disease
Advisor | Dr. Suzie H. Pun

2013 – 2019 (expected)

The University of Texas at Austin

B.S., Biomedical Engineering, Engineering Honors Program
Overall GPA | 3.97/4.00, *graduated with Highest Honors*

2009 – 2013

RESEARCH

NSF Graduate Research Fellow, University of Washington

Advisor | Dr. Suzie H. Pun, Department of Bioengineering

7/2013 – Present

Collaborator | Dr. Stuart J. Shankland, Department of Medicine, Division of Nephrology

- Primary author and co-author author of two U.S. Department of Defense-funded grants totaling \$2,500,000
- Mentored graduate students in fellowship applications, grant writing, and experimental design
- Developed a drug linker for acid-sensitive release of Bis-T-23 in cultured podocytes
- Identified anionic polymers that accumulate in the kidneys of normal and kidney disease animals
- Optimized a phage display analysis strategy and identified new M2 macrophage-binding peptides
- Determined cytotoxicity causes of thermosensitive hydrogels to a T cell line
- Characterized *Sleeping Beauty* transposon integration in a T cell line

Undergraduate Research Assistant, The University of Texas at Austin

Advisor | Dr. Krishnendu Roy, Department of Biomedical Engineering

9/2011 – 5/2013

Characterization of enzyme-degradable microgels for pulmonary drug delivery

- Characterized microgel swelling and degradation size distributions
- Evaluated release profile of various microgel formulations
- Quantified microgel lung uptake and retention *in vivo*

NIH BESIP Research Fellow, National Institutes of Health

Advisor | Dr. Mark A. Knepper, National Heart, Lung, and Blood Institute

6/2012 – 8/2012

Generating pseudo-Western blots from proteomics data

- Performed in-gel trypsinization and protein purification for LC-MS/MS analysis
- Developed an algorithm to generate pseudo-Western blots from mass spectrometry data

NSF REU Research Fellow, Rice University

Advisor | Dr. Vicki L. Colvin; supervised by Dr. Huiguang Zhu, Department of Chemistry

5/2011 – 8/2011

Phase-transferred magnetite nanoparticles for biological applications

- Optimized nanoparticle/polymer ratios for functionalization and aqueous phase transfer
- Characterized nanoparticle phase transfer stability and cytotoxicity

TEACHING

Teaching Assistant, Introduction to Bioengineering Problem Solving course, UW, Seattle, WA

9/2016 – 12/2016

- Delivered lectures, graded papers, and mentored students in research and bioengineering

Course Grader and Lecturer, Controlled Release course, UW, Seattle, WA

1/2016 – 3/2016

- Graded assignments and exams, delivered a lecture, and wrote exam questions

Geometry Tutor, self-employed, Seattle, WA

1/2015 – 8/2015

- Taught high school geometry 2 h/wk

PSAT/SAT/ACT Teacher, The Princeton Review, Austin, TX

4/2010 – 5/2013

- Taught strategies for test taking and innovated teaching strategies to engage students

Course Grader, Measurement/Instrumentation Laboratory course, UT Austin

8/2012 – 12/2012

- Graded over 50 students' lab reports and provided feedback to professor of common mistakes

Course Grader, Engineering Foundations of BME course, UT Austin

8/2011 – 12/2011

- Collaborated with TAs to create keys and provided feedback of common mistakes for teaching

PUBLICATIONS

*These authors contributed equally to the work

8. Y Cheng*, **GW Liu***, R Jain, JW Pippin, SJ Shankland, SH Pun. Boronic acid copolymers for direct loading and acid-triggered release of Bis-T-23 in cultured podocytes. *ACS Biomater. Sci. Eng.* 4, 3968-3973 (2018). [Link](#).
7. **GW Liu***, AN Prossnitz*, DG Eng, Y Cheng, N Subrahmanyam, JW Pippin, RJ Lamm, C Ngambenjawang, H Ghandehari, SJ Shankland, SH Pun. Glomerular disease augments kidney accumulation of synthetic anionic polymers. *Biomaterials* 178, 317-325 (2018). [Link](#).
6. P Jing, J Wu, **GW Liu**, EG Keeler, SH Pun, LY Lin. Photonic crystal optical tweezers with high efficiency for live biological samples and viability characterization. *Sci. Rep.* 6, 19924 (2015). [Link](#).
5. **GW Liu***, BR Livesay*, NA Kacherovsky, M Cieslewicz, E Lutz, A Waalkes, MC Jensen, SJ Salipante, SH Pun. Efficient identification of murine M2 macrophage peptide targeting ligands by phage display and next-generation sequencing. *Bioconjug. Chem.* 26, 1811-1817 (2015). [Link](#).
4. N Kacherovsky, **GW Liu**, MC Jensen, SH Pun. Multiplexed gene transfer to a human T-cell line by combining *Sleeping Beauty* transposon system with methotrexate selection. *Biotechnol. Bioeng.* 112, 1429-1436 (2015). [Link](#).
3. PZ Elias, **GW Liu**, H Wei, MC Jensen, PJ Horner, SH Pun. A functionalized, injectable hydrogel for localized drug delivery with tunable thermosensitivity: synthesis and characterization of physical and toxicological properties. *J. Control. Release* 208, 76-84 (2015). [Link](#).
2. JS Claxton, PC Sandoval, **G Liu**, C-L Chou, JD Hoffert, MA Knepper. Endogenous carbamylation of renal medullary proteins. *PLoS One* 8, e82655 (2013). [Link](#).
1. P Wanakule, **GW Liu**, AT Fleury, K Roy. Nano-inside-micro: Disease-responsive microgels with encapsulated nanoparticles for intracellular drug delivery to the deep lung. *J. Control. Release* 162, 429-437 (2012). [Link](#).

MENTORING

Tom McIlwain, UW Bioengineering class of 2020	10/2017 – 7/2018
Soren Johnson, UW Bioengineering class of 2018	11/2015 – 7/2018
<ul style="list-style-type: none"> ▪ Capstone Optimizing non-viral gene transfer to renal progenitor cells 	
Ritika Jain, UW Bioengineering class of 2019	11/2015 – Present
<ul style="list-style-type: none"> ▪ Awards & Fellowships NASA Summer Research Grant, 5/2016; ONPRC Summer Fellowship Program, 2017; nominated for ASF scholarship, 2018; NIH BESIP, 2018 ▪ Presentations Space Grant Awards Reception and Poster Session, 9/2016; 20th Annual Undergraduate Research Symposium, 5/2017 ▪ Capstone CXCR4 gene delivery to renal progenitor cells to augment cellular homing 	
Allie Carreno, UW Bioengineering class of 2019	7/2015 – 8/2015
<ul style="list-style-type: none"> ▪ Presentations Summer Undergraduate Research Poster Session, 8/2015 	
Jonathan Yu, UW Bioengineering class of 2016	5/2015 – 7/2016
<ul style="list-style-type: none"> ▪ Capstone Optimizing peptides for targeting tumor-associated macrophages ▪ Presentations 19th Annual Undergraduate Research Symposium, 5/2016 	
Rio Hoshi, UW Computer Science & Engineering class of 2018	10/2014 – 10/2015
<ul style="list-style-type: none"> ▪ Awards Mary Gates Research Scholarship, 3/2015 ▪ Presentations 18th Annual Undergraduate Research Symposium, 5/2015 	

CONFERENCE PROCEEDINGS & PRESENTATIONS

*These authors contributed equally to the work; presenting author is underlined

14. **GW Liu**, AN Prossnitz, DG Eng, Y Cheng, JW Pippin, RJ Lamm, C Ngambenjawang, SJ Shankland, SH Pun. Glomerular disease augments kidney accumulation of synthetic polymers. *American Society of Nephrology*, San Diego, CA, 2018. (Poster)
13. AN Prossnitz*, **GW Liu***, DG Eng, Y Cheng, JW Pippin, RJ Lamm, C Ngambenjawang, SJ Shankland, SH Pun. Glomerular disease augments kidney accumulation of synthetic anionic polymers. *Polymers in Medicine and Biology*, Napa, CA, 2018. (Poster)

12. **GW Liu**, JW Pippin, SJ Shankland, SH Pun. Bis-T-23 efficacy in *in vitro* models of podocyte injury. *nanoDDS*, Baltimore, MD, 2016. (Poster)
11. **C Ngambenjawong**, JMB Pineda, M Cieslewicz, **GW Liu**, SH Pun. Optimization of M2 macrophage-binding peptide (M2pep). *Controlled Release Society Annual Meeting & Exposition*, Seattle, WA, 2016. (Poster)
10. **GW Liu**. From patient to researcher: transforming kidney disease treatment. *Scholars' Studio: TRANSFORM*, Seattle, WA, 2016. (Talk)
9. **GW Liu**, SJ Shankland, SH Pun. Bioengineering and nephrology: Engineered renal progenitor cells for kidney disease treatment. *University of Washington Bioengineering Faculty Retreat*, Seattle, WA, 2015. (Talk)
8. **GW Liu***, **BR Livesay***, NA Kacherovsky, M Cieslewicz, E Lutz, A Waalkes, MC Jensen, SJ Salipante, SH Pun. Efficient identification of peptide targeting ligands by phage display and next-generation sequencing. *Biomedical Engineering Society 2015 Conference*, Tampa, FL, 2015. (Poster)
7. **NA Kacherovsky**, **GW Liu**, LF Horowitz, MC Jensen, SH Pun. Multiplexed gene transfer to human T-cells by combining Sleeping Beauty transposon system with methotrexate selection. *American Society of Gene & Cell Therapy*, New Orleans, LA, 2015. (Poster)
6. **P Jing**, J Wu, **GW Liu**, EG Keeler, Y Yang, SH Pun, LY Lin. Optical trapping on two-dimensional photonic crystal and cell viability characterization. *OSA Optics in the Life Sciences Congress*, Vancouver, BC, Canada, 2015. (Poster)
5. **G Liu**, JS Claxton, PC Sandoval, C-L Chou, MA Knepper. Mass spectrometry-based pseudo-Western blots. *Experimental Biology 2013 Conference*, Boston, MA, 2013. (Poster)
4. **JS Claxton**, **G Liu**, PC Sandoval, C-L Chou, MA Knepper. Protein carbamylation is a physiological post-translational modification in the renal inner medulla. *Experimental Biology 2013 Conference*, Boston, MA, 2013. (Talk, Poster)
3. **G Liu**, P Wanakule, A Fleury, K Roy. Enzyme-degradable microgel carriers for pulmonary disease-triggered release of biologics. *Biomedical Engineering Society Annual Conference 2012*, Atlanta, GA, 2012. (Poster)
2. **P Wanakule**, **G Liu**, A Fleury, K Roy. Enzymatically-Degradable Microgels for Pulmonary Disease-Responsive Release of Therapeutics. *Society for Biomaterials 2012 Fall Symposium*, New Orleans, LA, 2012. (Talk, Poster)
1. P Wanakule, **A Fleury**, **G Liu**, K Roy. Characterization of Enzyme-Responsive Microgels for Pulmonary Drug Delivery. *American Association of Pharmaceutical Scientists 2012 Conference*, San Diego, CA, 2012. (Poster)

SCHOLARSHIPS, FELLOWSHIPS, & AWARDS

Kidney STARS (Students and Residents) Travel Award, American Society of Nephrology	2018
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Husky 100 Award, University of Washington	2016
Kidney TREKS (Tutored Research and Education for Kidney Scholars) Program, American Society of Nephrology	2016
Kidney STARS (Students and Residents) Travel Award, American Society of Nephrology	2015
NSF Graduate Research Fellowship, National Science Foundation	2013 – 2018
Engineering Scholar, UT Austin	2012 – 2013
BESIP Research Fellowship, National Institutes of Health	2012
Distinguished College Scholar, UT Austin	2011 – 2013
Undergraduate Research Fellowship, UT Austin	2011 – 2012
NSF REU Fellowship, Rice University	2011
Biomedical Engineering Honors Society, Beta Mu Epsilon, UT Austin	2010 – 2013
Virginia & Ernest Cockrell Jr. Scholarship, UT Austin	2009 – 2013
ESCO Technologies Foundation Scholarship, ESCO	2009

SERVICE

- Volunteer**, NephCure Kidney International, Microsoft Giving Campaign, Seattle, WA *10/2016*
▪ Promoted NephCure to Microsoft employees for donations
- Session Co-Chair**, Controlled Release Society Annual Meeting & Exposition, Seattle, WA *7/2016*
- Volunteer**, Engineering Discovery Days, Seattle, WA *4/2016*
▪ Taught and showed students how to isolate DNA from strawberries
- Committee Member**, Bioengineering Distinguished Lecture Series Committee, Seattle, WA *6/2015 – 2/2016*
▪ Escorted faculty speakers around campus and promoted department research
- Activity Coordinator**, UW Bioengineering Outreach, Seattle, WA *1/2014 – 2/2014*
▪ Designed an activity teaching the multiple factors of cancerogenesis to high school students