

ALLEN P LIU

University of Michigan-Ann Arbor
2350 Hayward Street
2674 G.G. Brown Building
Ann Arbor, MI 48109

liulab.engin.umich.edu/liulab/home

email: allenliu@umich.edu

tel: (734) 764-7719

CURRENT POSITIONS:

2012-present Assistant Professor, Department of Mechanical Engineering, University of Michigan

2012-present Assistant Professor, Department of Biomedical Engineering, University of Michigan

Member, Cellular and Molecular Biology Program, University of Michigan

2013-present Member, Biophysics Program, University of Michigan

EDUCATION:

B.Sc., Biochemistry (with Honors), University of British Columbia, 2001

Ph.D., Biophysics, University of California-Berkeley, 2007. (advisor: Daniel Fletcher)

RESEARCH EXPERIENCE:

2007-2011 Postdoctoral Fellow, Cell Biology, The Scripps Research Institute, La Jolla, CA
(advisors: Gaudenz Danuser and Sandra Schmid)

2002-2007 Graduate Student, Biophysics, University of California-Berkeley, Berkeley, CA

2000-2001 Undergraduate Thesis, Biochemistry, University of British Columbia, Vancouver, Canada (advisor: Natalie Strynadka)

AWARDS AND HONORS:

2017 Future of Biophysics Symposium Speaker at Biophysical Society Meeting

2017 Rising Star Award from BMES-Cellular and Molecular Bioengineering

2014 Young Innovator in Cellular and Molecular Bioengineering

2013 UROP Outstanding Research Mentor Award – Honorable Mention, University of Michigan

2012 American Heart Association Scientist Development Grant (declined)

2012 NIH Director's New Innovator Award

2011 Society of Fellows Travel Award, The Scripps Research Institute

2008 Bernie Gilula Travel Award, The Scripps Research Institute

2008 Leukemia and Lymphoma Society Postdoctoral Fellowship

2008 Finalist, Helen Hay Whitney Foundation Fellowship

2007 Summer meeting travel award, American Society of Cell Biology

2005 Student travel award, Biophysical Society

2005 PGS-B Scholarship; Natural Sciences and Engineering Research Council, Canada

2003 PGS-A Scholarship; Natural Sciences and Engineering Research Council, Canada

2000 Science Scholar, University of British Columbia

PUBLICATIONS

1. Ho KKY, Lee LM, **Liu AP**, "Mechanically activated artificial cell using microfluidic deformation", *Scientific Report*, vol 6, 32912, 2016.
2. Lee LM, Lee JW*, Chase D, Gebrezgiabhier D, **Liu AP**, "Development of an advanced microfluidic micropipette aspiration device for single cell mechanics studies", *Biomicrofluidics*, 10, 054105, 2016. (Lee and Lee are co-first authors)

3. Peng Z, Pak O, **Liu AP**, Young YN, On the gating of mechanosensitive channels by fluid shear stress, *Acta Mechanica Sinica*, 32: 1012, 2016.
4. Zhu Q, Zheng F, **Liu AP**, Qian J, Fu C, Lin Y, Shape transformation of the nuclear envelope during closed mitosis, *Biophysical Journal*, 111, 2309-2316, 2016.
5. Wen PJ*, Grenklo S*, Hamid E, Tan X, Liao HS, Heureaux J, Chiang HC, Shin W, Zhao WD, Toilin N, Evergreen E, Brodin L, Karlsson R, Jin A, **Liu AP**, Shupliakov O, Wu LG, Actin and ATP provide mechanical force to collapse fusing vesicles at the plasma membrane, *Nature Communications*, 7:12604, 2016.
6. Caschera F*, Lee JW*, Ho KKY, **Liu AP**, Jewett MC, “Cell-free compartmentalized protein synthesis inside double emulsion template liposomes with in vitro synthesized and assembled ribosomes”, *ChemComm*, 52, 5467-5469, 2016. * equal contribution (co-corresponding author).
7. **Liu AP**, “Biophysical tools for cellular and subcellular mechanical actuation of cell signaling”, *Biophysical Journal*, vol 111, 1-7, 2016.
8. Tan X, Heureaux J, **Liu AP**, “Cell spreading area regulates clathrin-coated pit dynamics on micropatterned substrate”, *Integrative Biology*, 7, 1033 – 1043, 2015.
9. Lee LM, **Liu AP**, “The application of micropipette aspiration in molecular mechanics of single cells”, *ASME Journal of Nanotechnology in Engineering and Medicine*, 5(4): 040801-04081-6, 2014. (Themed issue on nanotechnology for biology and biomedical applications)
10. Ho KKY*, Murray VL*, **Liu AP**, “Engineering artificial cells by combining HeLa-based cell free expression and ultrathin double emulsion template”, *Methods in Cell Biology*, vol 128, Chapter 16, 303-318, 2015. * equal contribution
11. Lee LM, **Liu AP**, Microfluidic pipette array for mechanophenotyping of cancer cells and mechanical gating of mechanosensitive channels, *Lab on a Chip*, vol. 15, 264-273, 2015.
12. Heureaux J, Chen D, Murray VL, Deng CX, **Liu AP**, “Activation of a bacterial mechanosensitive channel in mammalian cells by cytoskeletal stress”, *Cellular and Molecular Bioengineering*, vol. 7 no. 3. 307-319, 2014. *Young Innovators Special Issue
13. Steel EM, Murray VL, **Liu AP**, “Multiplex detection of homo- and heterodimerization of G protein-coupled receptors by proximity biotinylation”, *PLoS One*, vol 9 (4), e93646, 2014.
14. Coyne C, Patel K, Heureaux J, Stachowiak J, Fletcher DA, **Liu AP**, “Lipid bilayer vesicle generation using microfluidic jetting”, *Journal of Visual Experiments*, e51510, 2014.
15. Shao Y*, Tan X*, Novitski R, Muqaddam M, List PT, Williamson L, Fu J, **Liu AP**, Uniaxial cell stretching device for high resolution live cell imaging of mechanosensitive functions, *Review of Scientific Instruments*, 84, 114304, 2013. * equal contribution
16. Lin H, **Liu AP**, Smith TH, Trejo J, “Dimerization of proteinase-activated receptors and signaling specificity”, *Pharmacology Review*, vol 65: 1198-1213, 2013.

Prior to University of Michigan (2005-2011)

17. Nunez D, Antonescu C, Mettlen M, **Liu AP**, Schmid SL, Loerke D, Danuser G, “Hotspots organize clathrin-mediated endocytosis by efficient recruitment and retention of nucleating resources”, *Traffic*, vol 12 (12), 1868-1878, 2011.
18. **Liu AP**, Aguet F, Danuser G, Schmid SL, “Local clustering of transferrin receptors promotes clathrin-coated pit initiation”, *Journal of Cell Biology*, vol 191 (7), 1381-1393, 2010.
19. Banerjee D, **Liu AP**, Voss N, Schmid SL, Finn M.G., “Multivalent display of transferrin on virus-like particles by click chemistry and receptor-mediated endocytosis”, *ChemBioChem*, vol 11, 1273-1279, 2010.
20. **Liu AP**, Loerke D, Schmid SL, Danuser G, “Global and local regulation of clathrin coated pit dynamics detected on patterned substrates”, *Biophysical Journal*, vol 97 (4), 1038-1047, 2009.

21. **Liu AP**, Fletcher DA, “Biology under construction: *in vitro* reconstitution of cellular processes”, *Nature Reviews Molecular Cell Biology*, vol 10 (9), 644-650, 2009.
22. **Liu AP***, Richmond DL*, Maibaum L, Pronk S, Geissler PL, Fletcher DA, “Membrane-induced bundling of actin filaments”, *Nature Physics*, vol 4, 789-793, 2008. *equal contribution
23. Stachowiak J, Richmond DL, Li TH, **Liu AP**, Parekh SH, Fletcher DA, “Giant unilamellar vesicle formation and encapsulation by microfluidic jetting”, *Proceeding of National Academy of Sciences*, vol 105, 4697-4702, 2008.
24. Choy JL, Parekh SH, Chaudhuri O, **Liu AP**, Bustamante C, Footer MJ, Theriot JA, Fletcher DA, “Differential force microscope for long-timescale biophysical measurements” *Review of Scientific Instruments*, vol 78, 043711, 2007.
25. **Liu AP**, Fletcher DA, “Actin polymerization serves as a membrane domain switch in model lipid bilayer”, *Biophysical Journal*, vol. 91, 4064-4070, 2006.
See also New and Notable: M. Edidin, “Switching sides: The actin/membrane lipid connection” *Biophysical Journal*, vol. 91, 3963, 2006.
26. **Liu AP**, Fletcher DA, “Photopatterning of actin filament structures”, *Nano Letters*, vol. 5, no. 4, 625-628, 2005.
27. Chen, DHC, **Liu, APC**, and Koga, Y (2001) Excess Partial Molar Enthalpy of 1-Propanol in 1-Propanol-Acetone (or Tetramethyl Urea) - H₂O at 25°C. *Fluid Phase Equil.*, 189: 31-38.

MANUSCRIPTS UNDER REVIEW

1. Irajizad E, Walani N, Veatch SL, Liu AP, Agrawal A, Clathrin polymerization exhibits high mechano-geometric sensitivity, submitted.
2. Ma F, Chung MT, Nidetz R, Kitabayashi T, Xie Y, Han Y, Lee LM, Liu AP, Yang G, Feng Y, Kurabayashi K, “Ultrahigh throughput dual-substrate single-cell enzymatic assay by microfluidic droplet sorting”, under preparation.
3. Parekh S, Chaudhuri O, Liu AP, “New advances in cell-extracellular matrix research”, under preparation.
4. Ho KKY, Lee JW, Durand, G, Liu AP, “Encapsulation of mammalian expression system in lipid vesicles”, under review.

PROFESSIONAL SOCIETY

American Society for Cell Biology
Biophysical Society
Biomedical Engineering Society

PROFESSIONAL ACTIVITIES

Session Chair of Cellular and Molecular Engineering Track at BMES 2012
Session Chair of Characterization of Biological Cells at ASME 2012
Session Chair of Cellular and Molecular Engineering Track at BMES 2013
Steering Committee, Emerging Information and Technology Conference – Biomedical Science and Engineering track, 2013 – now
Executive Committee, Microfluidics in Biological Sciences and Technology Program, University of Michigan, 2014 – now
National Institutes of Health Panel Member – 2016
National Science Foundation Panel Member – 2014, 2015, 2017

PATENTS:

Forming an artificial cell with controlled membrane composition, asymmetry and contents, US Patent 20,130,028,963.

INVITED TALKS:

1. City University of Hong Kong, Department of Mechanical and Biomedical Engineering, Hong Kong (6/2017)
2. University of Hong Kong, Department of Mechanical Engineering, Hong Kong (6/2017)
3. Canadian Society for Molecular Biosciences Annual Meeting, Ottawa, Canada (5/2017)
4. Stanford University, Biomechanics seminar series, Palo Alto, CA (4/2017)
5. Arizona State University, Center for Biophysics, Tempe, AZ (3/2017)
6. Future of Biophysics Symposium, Biophysics Society Annual Meeting, New Orleans, LA (2/2017)
7. BMES-CMBE Annual Meeting, Hawaii (1/2017)
8. Oakland University, Physics Colloquium, Rochester Hill, MI (10/2016)
9. Max Planck Institute for Polymer Research, Mainz, Germany (10/2016)
10. University of Geneva, Department of Cell Biology, Geneva, Switzerland (10/2016)
11. Brown University, Department of Biomedical Engineering, Providence, RI (10/2016)
12. Pennsylvania State University, Department of Biomedical Engineering, State College, PA (09/2016)
13. Peking University, Center for Life Sciences, Beijing, China (08/2016)
14. Mechanobiology Meeting, Shanghai, China (08/2016)
15. Microtechnologies in Medicine and Biology, Seoul, South Korea (04/2016)
16. Institute of Biological Engineering Annual Meeting, Greenville, SC (04/2016)
17. University of Minnesota, Biophysics Seminar Series, Minneapolis, MN (04/2016)
18. Academia Sinica, Taipei, Taiwan (01/2016)
19. National Taiwan University, Institute of Molecular Medicine, Taipei, Taiwan (01/2016)
20. American Society for Cell Biology Meeting, San Diego, CA (12/2015)
21. University of Michigan, Saturday Morning Physics, Ann Arbor, MI (11/2015)
22. Wayne State University, Undergraduate Research Conference in Physics, Detroit, MI (11/2015)
23. Georgia Institute of Technology, Bioengineering Seminar Series, Atlanta, GA (10/2015)
24. National Cheng Kung University, Medical Device Innovation Center, Tainan, Taiwan (10/2015)
25. National University of Singapore, Mechanobiology Institute, Singapore (07/2015)
26. World Association for Chinese Biomedical Engineers 2015, Singapore (07/2015)
27. Biomedical Engineering Society Meeting, San Antonio, TX (10/2014)
28. Cornell University, Biophysics Department, Ithaca, NY (10/2014)
29. Chicago Cytoskeleton Meeting, Chicago, IL (09/2014)
30. Johns Hopkins University, Department of Cell Biology, Baltimore, MD (05/2014)
31. American Physical Society, Denver, CO (03/2014)
32. Carnegie Mellon University, Department of Biomedical Engineering, Pittsburg, PA (02/2014)
33. Molecular Biophysics Training Grant Symposium, University of Michigan (01/2014)
34. Society for Engineering Sciences, Providence, RI (07/2013)
35. Workshop on Physical Approaches to Studying the Cytoskeleton and Cell Motility, Chicago, IL (03/13)
36. Wayne State University, Department of Biology, Detroit, MI (02/2013)
37. American Society of Mechanical Engineers Meeting, Houston, TX (11/2012)
38. Emerging Information and Technology Conference, Toronto, ON, Canada (08/2012)
39. The Scripps Research Institute Florida, Jupiter, FL (06/2012)
40. University of Michigan Nanotechnology and Integrated Microsystems Student Association Faculty Seminar Series, Ann Arbor, MI (06/2012)
41. Pennsylvania Muscle Institute, University of Pennsylvania, Philadelphia, PA (05/2011)
42. American Chemical Society, Anaheim, CA (3/28/2011)

43. Gordon-Kenan Research Seminar in Molecular Pharmacology, Ventura, CA (01/2011)
44. Harvard Medical School Computational Cell Biology Retreat, Woods Hole, MA (01/2010)
45. TSRI Cell Biology Retreat, San Diego, CA (10/2009)
46. Biophysical Society Meeting, Boston, MA (03/2009)
47. NIH Nanomedicine Development Center Annual Meeting, Washington, DC (04/2007)
48. Biophysical Society Meeting, Salt Lake City, UT (03/2006)