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Independent Position

2016-present Assistant Professor, The Rockefeller University
Head, Laboratory of Nanoscale Biophysics and Biochemistry
Faculty Member, Tri-Institutional PhD Program in Chemical Biology
Faculty Member, Tri-Institutional MD-PhD Program

Academic Training

	Role / Degree:	Institution and Location:	Advisor:
2010-2015	Postdoc, Biophysics	UC Berkeley, CA, USA	Carlos J. Bustamante
2003-2009	Ph.D., Chemistry	Harvard University, MA, USA	Xiaowei Zhuang
1998-2003	B.S., Biology	USTC, Hefei, China	Mian Wu

Honors

2020 Pershing Square Sohn Prize
2018 NIH Director's New Innovator Award
2018 Sinsheimer Scholar
2017 Kimmel Scholar
2017 March of Dimes Basil O'Connor Scholar
2017 Quadrivium Award for Innovative Research in Epigenetics
2016 Monique Weill-Caulier Career Scientist Award
2013 NIH Pathway to Independence Award
2012 Biophysical Society Education Travel Award
1998 #1 Ranked Freshman in the Special Class for the Gifted Young, USTC

Publications

(* denotes equal contribution; # denotes corresponding author)

Preprints

1. Leicher R, Ge Ej*, Lin X*, Reynolds MJ*, Walz T, Zhang B#, Muir TW, **Liu S#**. PRC2 bridges non-adjacent nucleosomes to establish heterochromatin. *bioRxiv* 795260. doi:10.1101/795260
2. Mei L, de los Reyes SE, Reynolds MJ, **Liu S**, Alushin GM. Molecular mechanism for direct actin force-sensing by α -catenin. *bioRxiv* 2020.02.18.954735. doi:10.1101/2020.02.18.954735
3. Mickolajczyk KJ*, Shelton PM*, Grasso M*, Cao X*, Warrington SR, Aher A, **Liu S#**, Kapoor TM#. Force-dependent stimulation of RNA unwinding by SARS-CoV-2 nsp13 helicase. *bioRxiv* 2020.07.31.231274. doi:10.1101/2020.07.31.231274

Research articles

1. Wang L*, Johnson ZL*, Wasserman MR*, Levring J*, Chen J#, **Liu S#**. (2020) Characterization of the kinetic cycle of an ABC transporter by single-molecule and cryo-EM analyses. *eLife* 9, e56451. doi:10.7554/eLife.56451
2. Li S, Zheng EB, Zhao L, **Liu S#**. (2019) Nonreciprocal and conditional cooperativity directs the pioneer activity of pluripotency transcription factors. *Cell Rep* 28, 2689-2703. doi:10.1016/j.celrep.2019.07.103
3. Wasserman MR*, Schauer GD*, O'Donnell ME#, **Liu S#**. (2019) Replication fork activation is enabled by a single-stranded DNA gate in CMG helicase. *Cell* 178, 600-611. doi:10.1016/j.cell.2019.06.032
4. Ju X, Li D, **Liu S#**. (2019) Full-length RNA profiling reveals pervasive bidirectional transcription terminators in bacteria. *Nat Microbiol* 4, 1907-1918. doi:10.1038/s41564-019-0500-z
5. Zheng Q, Omans ND, Leicher R, Osunsade A, Agustinus AS, Finkin-Groner E, D'Ambrosio H, Liu B, Chandarlapaty S, **Liu S**, David Y. (2019) Reversible histone glycation is associated with disease-related changes in chromatin architecture. *Nat Commun* 10, 1289. doi:10.1038/s41467-019-09192-z
6. Tafoya S, Large SJ, **Liu S**, Bustamante C, Sivak DA. (2019) Using a system's equilibrium behavior to reduce its energy dissipation in nonequilibrium processes. *Proc Natl Acad Sci U S A* 116, 5920-5924. doi:10.1073/pnas.1817778116
7. Wang L, Mo CY, Wasserman MR, Rostøl JT, Marraffini LA, **Liu S#**. (2019) Dynamics of Cas10 govern discrimination between self and non-self in type III CRISPR-Cas immunity. *Mol Cell* 73, 278-290. doi:10.1016/j.molcel.2018.11.008
8. Tafoya S, **Liu S**, Castillo JP, Atz R, Morais MC, Grimes S, Jardine PJ, Bustamante C. (2018) Molecular switch-like regulation enables global subunit coordination in a viral ring ATPase. *Proc Natl Acad Sci U S A* 115, 7961-7966. doi:10.1073/pnas.1802736115
9. Cheng B, Wu S, **Liu S**, Rodriguez-Aliaga P, Yu J, Cui S. (2015) Protein denaturation at a single-molecule level: the effect of nonpolar environments and its implications on the unfolding mechanism by proteases. *Nanoscale* 7, 2970-2977. doi:10.1039/c4nr07140a
10. **Liu S***, Chistol G*, Hetherington CL*, Tafoya S, Aathavan K, Schnitzbauer J, Grimes S, Jardine PJ, Bustamante C. (2014) A viral packaging motor varies its DNA rotation and step size to preserve subunit coordination as the capsid fills. *Cell* 157, 702-713. doi:10.1016/j.cell.2014.02.034
11. Dangkulwanich M*, Ishibashi T*, **Liu S***, Kireeva ML, Lubkowska L, Kashlev M, Bustamante C. (2013) Complete dissection of transcription elongation reveals slow translocation of RNA polymerase II in a linear ratchet mechanism. *eLife* 2, e00971. doi:10.7554/eLife.00971
12. Chistol G*, **Liu S***, Hetherington CL, Moffitt JR, Grimes S, Jardine PJ, Bustamante C. (2012) High degree of coordination and division of labor among subunits in a homomeric ring ATPase. *Cell* 151, 1017-1028. doi:10.1016/j.cell.2012.10.031
13. **Liu S***, Harada BT*, Miller JT, Le Grice SF, Zhuang X. (2010) Initiation complex dynamics direct the transitions between distinct phases of early HIV reverse transcription. *Nat Struct Mol Biol* 17, 1453-1460. doi:10.1038/nsmb.1937
14. Chung S, Wendeler M, Rausch JW, Beilhartz G, Gotte M, O'Keefe BR, Bermingham A, Beutler JA, **Liu S**, Zhuang X, Le Grice SF. (2010) Structure-activity analysis of vinylogous urea inhibitors of human immunodeficiency virus-encoded ribonuclease H. *Antimicrob Agents Chemother* 54, 3913-3921. doi:10.1128/AAC.00434-10
15. **Liu S**, Abbondanzieri EA, Rausch JW, Le Grice SF, Zhuang X. (2008) Slide into action: dynamic shuttling of HIV reverse transcriptase on nucleic acid substrates. *Science* 322, 1092-1097. doi:10.1126/science.1163108
16. **Liu S**, Bokinsky G, Walter NG, Zhuang X. (2007) Dissecting the multistep reaction pathway of an RNA enzyme by single-molecule kinetic "fingerprinting". *Proc Natl Acad Sci U S A* 104, 12634-12639. doi:10.1073/pnas.0610597104
17. Bokinsky G, Nivón LG, **Liu S**, Chai G, Hong M, Weeks KM, Zhuang X. (2006) Two distinct binding modes of a protein cofactor with its target RNA. *J Mol Biol* 361, 771-784. doi:10.1016/j.jmb.2006.06.048

18. Song Z, **Liu S**, He H, Hoti N, Wang Y, Feng S, Wu M. (2004) A single amino acid change (Asp53->Ala53) converts Survivin from anti-apoptotic to pro-apoptotic. *Mol Biol Cell* 15, 1287-1296. doi:10.1091/mbc.e03-07-0512

Review articles

1. Wasserman MR, **Liu S**#. (2019) A tour de force on the double helix: exploiting DNA mechanics to study DNA-based molecular machines. *Biochemistry* 58, 4667-4676. doi:10.1021/acs.biochem.9b00346
2. **Liu S***, Chistol G*, Bustamante C#. (2014) Mechanical operation and intersubunit coordination of ring-shaped molecular motors: insights from single-molecule studies. *Biophys J* 106, 1844-1858. doi:10.1016/j.bpj.2014.03.029

Book chapters

1. **Liu S**#, Tafoya S, Bustamante C#. (2017) Deciphering the molecular mechanism of the bacteriophage ϕ 29 DNA packaging motor. In *Optical Tweezers: Methods and Protocols* (eds. Gennerich A, Humana Press), *Methods Mol Biol* vol 1486, pp 343-355. doi:10.1007/978-1-4939-6421-5_13
2. Rausch JW, Abbondanzieri EA, **Liu S**, Zhuang X, Le Grice SF. (2010) Retrovirus replication: new perspectives on enzyme and substrate dynamics. In *Recent Advances in Human Retroviruses: Principles of Replication and Pathogenesis* (eds. Lever A, Jeang KT, Berkhout B. World Scientific), pp 307-343. doi:10.1142/9789814295314_0010

Patent

Liu S, Ju X. *US 62/851,969 application*. Methods of full-length RNA profiling

Professional activities

Member, Biophysical Society (2005-present)

Journal article reviewer for *Cell*, *Nature*, *Science*, *Mol Cell*, *Nat Microbiol*, *Nat Commun*, *PNAS*, *eLife*, *JACS*, *NAR*, *Sci Rep*, *PLoS One*

Ad hoc proposal reviewer for *Novo Nordisk Foundation*, *Wellcome Trust*, *HK Research Grants Council*

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Updated 08/01/2020