

Zackary N. Scholl, Curriculum Vitae

- RESEARCH INTERESTS Protein and cellular biophysics, structural biology, molecular dynamics, lab instrumentation and design
- EDUCATION
- University of Alberta**
Post-doc in Physics department (2017-2018)
Advisor: Dr. Michael Woodside
- Duke University**
Post-doc in Mechanical engineering department (2016-2017)
Ph.D. in Computational Biology and Bioinformatics, (2010-2016)
Certificate in College Teaching, July 2016
Dissertation title: The (Un)Folding of Multidomain Proteins Through the Lens of Single-Molecule Force-Spectroscopy and Computer Simulation
Advisors: Prof. Weitao Yang and Prof. Piotr Marszalek
- University of Washington at Seattle**
B.S. in Applied Computational Math Sciences, (2006-2010)
B.S. in Physics (with honors), (2006-2010)
- PUBLICATIONS
20. Li, Q.*, **Scholl, Z. N.**, & Marszalek, P. E.. (2018) Unraveling the mechanical unfolding pathways of a complex, multidomain protein: phosphoglycerate kinase. *Biophysical Journal*.
19. **Scholl, Z. N.**, Marszalek, P.E. (2018) AFM-Based Single-Molecule Force Spectroscopy of Proteins. *Methods in Molecular Biology* (book).
18. Plata P. A., **Scholl, Z. N.**, Marszalek, P.E., Prados A. (2018) Relevance of the Speed and Direction of Pulling in Simple Modular Proteins. *Journal of Chemical Theory and Computation*.
17. Mojumdar S. S., **Scholl, Z. N.**, Dee D. R., Rouleau L., Anand U., Garden C., & Woodside, M. (2017). Partially native intermediates mediate misfolding of SOD1 in single-molecule folding trajectories. *Nature Communications*.
16. **Scholl, Z. N.**, Yang, W. & Marszalek, P. E. (2017) Reconstructing the Folding of Luciferase to Elucidate the Vectorial Folding Pathways of Large, Multidomain Proteins. *Biophysical Journal*.
15. Gonzalez, M. A., Simon, J. R., Ghoorchian A., **Scholl, Z. N.**, Lin, S., Rubinstein, M., Marszalek, P., Chilkoti, A., Lopez G. P., Zhao, Z. (2016). Strong, tough, stretchable and self-adhesive hydrogels from intrinsically unstructured proteins. *Advanced Materials*.
14. **Scholl, Z. N.**, Li, Q., Yang, W. & Marszalek, P. E. (2016). Single-molecule force-spectroscopy reveals the calcium dependency of folding intermediates in the multidomain Protein S. *Journal of Biological Chemistry*.
13. Josephs, E.A., **Scholl, Z. N.**, & Marszalek, P. E. (2016). AFM Force Spectroscopy. *Introduction to Single Molecule Biophysics Book*.

12. **Scholl, Z. N.***, Josephs, Eric.*, & Marszalek, P. E. (2016). A Modular, Non-Degenerate Polyprotein Scaffold for Atomic Force Spectroscopy. *Biomacromolecules*.
11. **Scholl, Z. N.***, Zhong, J.*, Hartemink, A. J. (2015). Chromatin interactions correlate with local transcriptional activity in *Saccharomyces cerevisiae*. *bioRxiv*.
10. **Scholl, Z. N.**, Yang, W., & Marszalek, P. E. (2015). Direct Observation of Multimer Stabilization in the Mechanical Unfolding Pathway of a Protein Undergoing Oligomerization. *ACS Nano*.
9. Li, Q., **Scholl, Z. N.**, & Marszalek, P. E. (2014). Capturing the Mechanical Unfolding Pathway of a Large Protein with Coiled-Coil Probes. *Angewandte Chemie International Edition*.
8. **Scholl, Z. N.**, Yang, W., & Marszalek, P. E. (2014). Chaperones Rescue Luciferase Folding by Separating its Domains. *Journal of Biological Chemistry*, M114.582049.
7. **Scholl, Z. N.**, & Marszalek, P. E. (2014). Unraveling the Mysteries of Chaperone Interactions of the Myosin Head. *Biophysical journal*, 107(3), 541-542. (Commentary)
6. Li, Q., **Scholl, Z. N.**, & Marszalek, P. E. (2014). Nanomechanics of Single Biomacromolecules. In *Handbook of Nanomaterials Properties* (pp. 1077-1123). Springer Berlin Heidelberg.
5. **Scholl, Z. N.**, & Marszalek, P. E. (2014). Improving single molecule force spectroscopy through automated real-time data collection and quantification of experimental conditions. *Ultramicroscopy*, 136, 7-14.
4. **Scholl, Z. N.**, Li, Q., & Marszalek, P. E. (2014). Single molecule mechanical manipulation for studying biological properties of proteins, DNA, and sugars. *Wiley Interdisciplinary Reviews: Nanomedicine and Nanobiotechnology*, 6(3), 211-229.
3. **Scholl, Z. N.***, Rabbi, M.*, Lee, D., Manson, L., Hanna, S., & Marszalek, P. E. (2013). Origin of Overstretching Transitions in Single-Stranded Nucleic Acids. *Physical review letters*, 111(18), 188302.
2. Loksztajn, A., **Scholl, Z. N.**, & Marszalek, P. E. (2012). Atomic force microscopy captures folded ribosome bound nascent chains. *Chem. Commun.*, 48(96), 11727-11729.
1. Magwene, P. M., Kayikci, O., Granek, J. A., Reininga, J. M., **Scholl, Z. N.**, & Murray, D. (2011). Outcrossing, mitotic recombination, and life-history trade-offs shape genome evolution in *Saccharomyces cerevisiae*. *Proceedings of the National Academy of Sciences*, 108(5), 1987-1992.

CONFERENCE
PRESENTATIONS

Single-molecule force-spectroscopy reveals the calcium dependency of folding intermediates in the multidomain Protein S, Biophysical Society. (February 2016)

Direct measurement of the multimer stabilization in the mechanical unfolding pathway of Streptavidin, Biophysical Society. (February 2016)

Single-molecule force-spectroscopy reveals the calcium dependency of folding intermediates in the multidomain Protein S, Gordon Conference. (January 2016)

N-terminal domain of Luciferase controls misfolding avoidance, Biophysical Society. (February 2015)

N-terminal domain of Luciferase controls misfolding avoidance, Single Molecule Biophysics Meeting. (January 2015)

N-terminal domain of Luciferase controls misfolding avoidance, 28th Protein Society Meeting. (July 2014)

Direct measurement of the multimer stabilization in the mechanical unfolding pathway of Streptavidin, 28th Protein Society Meeting. (July 2014)

N-terminal domain of Luciferase prevents folding pathway from falling into kinetic trap, 58th Biophysical Society Meeting. (February 2014) *Awarded the Student Research Achievement Award for poster

Origin of Overstretching Transitions in Single-Stranded Nucleic Acids, 58th Biophysical Society Meeting. (February 2014)

N-terminal domain of Luciferase prevents folding pathway from falling into kinetic trap, Gordon Conference on Protein Folding Dynamics. (January 2014)

An AFM study on the ligand influenced mechanical unfolding pathway of Luciferase, 27th Symposium of The Protein Society. (July 2013)

Improving single molecular force spectroscopy through real-time data collection and quantification of experimental conditions, 57th Symposium of The Biophysical Society. (February 2013)

Atomic force microscopy captures ribosome bound nascent chains, 57th Symposium of The Biophysical Society. (February 2013)

*Mapping transcription factories in *Saccharomyces cerevisiae**, Pacific Symposium on Biocomputing. (January 2012)

TEACHING EXPERIENCE

Autumn	2014	Teaching Assistant, Thermodynamics for engineers
Fall	2013	Teaching Assistant, Thermodynamics for engineers
Spring	2013	Teaching Assistant, Special topics in single molecule techniques
Fall	2012	Teaching Assistant, Genomic tools and technology

HONORS AND AWARDS

2016	Education award for the Biophysical Society
2016	Travel award for the Gordon conference in Protein Folding
2015–2016	Katherine Stern Dissertation award
2015	Travel award for the Single Molecule Biophysics Meeting
2014	Biophysical Society Student Research Achievement Award
2013	Biophysical Society Art of Science Top 10 Images
2013	Travel award for 27th Symposium of The Protein Society
2012	Travel award for Pacific Symposium on Biocomputing
2012–2015	NSF GRFP award
2011–2012	NSF GRFP Honorable mention
2010–2012	Chancellor's scholarship
2010–2014	James B. Duke Fellowship

SOCIETY MEMBERSHIP

	2012-present	Biophysical Society	
	2013-present	Protein Society	
OUTREACH	March 2015	Volunteer consultant for the ASA Datafest competition at Duke University	Contact: Mine Cetinkaya-Rundel (cetinkaya.mine@gmail.com).
	Yearlong 2011-2013	Mentor for NSF-funded BOOST (Building Opportunities and Overtures in Science and Technology) program to educate/inspire under-represented minorities in science fields.	Contact: Solita Denard (solita.denard@duke.edu)
	February 2011 and February 2012	Volunteer educator for week-long integrative science course with local high school students at North Carolina School for Science and Math	Contact: Paul Magwene (paul.magwene@duke.edu)
PROFESSIONAL TRAVEL	Summer 2012	Two weeks spent at Prof. Klaus Schulten's lab to learn molecular dynamics	
PROFESSIONAL EXPERIENCE		Peer reviewer for <i>Angewandte Chemie Int. Ed.</i> , <i>Cell</i> , <i>Biophysical Journal</i> , <i>JACS</i> , <i>Langmuir</i> , and <i>ACS Nano</i> .	
		Developed NSF grants including R21 instrumentation and R01	
GRADUATE COURSEWORK		<input type="checkbox"/> Structural biology <input type="checkbox"/> Biochemistry methods (NMR, X-ray) <input type="checkbox"/> Algorithms <input type="checkbox"/> Systems biology	<input type="checkbox"/> Genomic tools and technology <input type="checkbox"/> Special topics in single molecule methods <input type="checkbox"/> Statistical mechanics
RELEVANT SKILLS	Languages:	English, Spanish (intermediate)	
	Programming:	Python, Go, Java, Javascript, Igor, Matlab, Mathematica, LaTeX, Unix,	
	Office software:	ViM, Microsoft Excel, Word, Illustrator, Photoshop	
	Molecular software:	VMD, NAMD, GROMACS, PyMOL, KiNG, Spartan	
	Control systems:	LabView, Circuit design	