

# Zackary N. Scholl, Curriculum Vitae

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- RESEARCH INTERESTS Protein folding, single molecule techniques, structural biology, molecular dynamics
- EDUCATION **Duke University**  
Ph.D. in Computational Biology and Bioinformatics, July 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, June 2010  
B.S. in Physics (with honors), June 2010
- PUBLICATIONS Plata, C., **Scholl, Z. N.\***, & Marszalek, P. E. (*In preparation*). Relevance of the speed and direction of pulling in simple modular proteins. *Biophysical Journal*.
- Li, Q.\*, **Scholl, Z. N.**, Marszalek, P. E., & Prados A. (*In preparation*). . *Biophysical Journal*.
- Mojumdar S. S., **Scholl, Z. N.**, Dee D. R., Rouleau L., Anand U., Garden C., & Woodside, M. (*In revision*). 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. Lokszejn, 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*, 28<sup>th</sup> Protein Society Meeting. (July 2014)

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

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

*Origin of Overstretching Transitions in Single-Stranded Nucleic Acids*, 58<sup>th</sup> 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*, 27<sup>th</sup> Symposium of The Protein Society. (July 2013)

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

*Atomic force microscopy captures ribosome bound nascent chains*, 57<sup>th</sup> 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 *Angewandte Chemie Int. Ed.*, *Cell*, *Biophysical Journal*, *JACS*, *Langmuir*, and *ACS Nano*.

Developed NSF grants including R21 instrumentation and R01

GRADUATE COURSEWORK

<input type="checkbox"/> Structural biology	<input type="checkbox"/> Genomic tools and technology
<input type="checkbox"/> Biochemistry methods (NMR, X-ray)	<input type="checkbox"/> Special topics in single molecule methods
<input type="checkbox"/> Algorithms	<input type="checkbox"/> Statistical mechanics
<input type="checkbox"/> Systems biology	

RELEVANT SKILLS

Languages:	English, Spanish (intermediate)
Programming:	Python, Golang, Javascript, Matlab, Mathematica, LaTeX, Unix, HTML, CSS, Javascript, PHP
Office software:	ViM, Microsoft Excel, Word, Illustrator, Photoshop
Molecular software:	VMD, NAMD, GROMACS, PyMOL, KiNG, Spartan
Control systems:	LabView, Circuit design