
CURRICULUM VITAE

BIOGRAPHICAL

Name: Sanford Leuba **Citizenship:** USA

Business Address: Department of Cell Biology
University of Pittsburgh School of Medicine
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EDUCATION AND TRAINING

UNDERGRADUATE:

<i>Dates Attended</i>	<i>Name and Location of Institution</i>	<i>Degree Received and Year</i>	<i>Major Subject</i>
1983-1986	North Carolina State Univ. Raleigh, NC	B. S. - 1986	Biochemistry

GRADUATE:

<i>Dates Attended</i>	<i>Name and Location of Institution</i>	<i>Degree Received and Year</i>	<i>Major Subject</i>
1986-1993	Oregon State University Corvallis, OR	Ph.D. - 1993	Biochemistry/Biophysics Advisor: K. E. van Holde

POST-GRADUATE:

<i>Dates Attended</i>	<i>Name and Location of Institution</i>	<i>Name of Program Director and Discipline</i>
1994-1997	University of Oregon Eugene, OR	Visualization of single chromatin fibers Director: C. Bustamante
1997-1998	Arizona State University Tempe, AZ	Manipulating single chromatin fibers Director: S. Lindsay

APPOINTMENTS AND POSITIONS

ACADEMIC:

<i>Years Inclusive</i>	<i>Institution</i>	<i>Rank/title</i>
1994 - 1997	Institute of Molecular Biology University of Oregon	Research Fellow
1997 - 1998	Department of Physics and Astronomy Arizona State University	Research Fellow
1998 - 2002	National Cancer Institute National Institutes of Health	Research Fellow
2002– 2008	Department of Cell Biology University of Pittsburgh School of Medicine	Assistant Professor
2008– present	Department of Cell Biology University of Pittsburgh School of Medicine	Associate Professor

MEMBERSHIPS IN PROFESSIONAL AND SCIENTIFIC SOCIETIES

<i>Organization</i>	<i>Year</i>
Biophysical Society	1997

HONORS

<i>Title of Award</i>	<i>Year</i>
National Institutes of Health Training Grant	1986-1987
National Institutes of Health Post-doctoral Fellowship	1994-1997
National Cancer Institute Scholar	1998-2002
University of Pittsburgh Innovator Award	2007

PUBLICATIONS

1) Refereed articles (over 1015 non-self citations as of 9 August 2007; H-factor of 19 papers with 19 citations)

1. Garcia-Ramirez, M., Leuba, S. H. and Ausio, J. One-step fractionation method for isolating H1 histones from chromatin under nondenaturing conditions. *Protein Expr. Purif.* **1**, 40-44, 1990. PMID 2152183

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2. Krylov, D., Leuba, S., van Holde, K. and Zlatanova, J. Histones H1 and H5 interact preferentially with cross-overs of double helical DNA. Proc. Natl. Acad. Sci. USA **90**, 5052-5056, 1993. (Cited 40 times) PMID 8506351
 3. Leuba, S. H., Zlatanova, J. and van Holde, K. On the location of histones H1 and H5 in the chromatin fiber. Studies with immobilized trypsin and chymotrypsin. J. Mol. Biol. **229**, 917-929, 1993. (Cited 23 times) PMID 8289325
 4. Yang, G., Leuba, S. H., Bustamante, C., Zlatanova, J. and van Holde, K. Role of linker histones in extended chromatin fibre structure. Nature Struct. Biol. **1**, 761-763, 1994. (Cited 27 times) PMID 7634084
 5. Leuba, S. H., Yang, G., Robert, C., Samori, B., van Holde, K., Zlatanova, J. and Bustamante, C. Three-dimensional structure of extended chromatin fibers as revealed by tapping-mode scanning force microscopy. Proc. Natl. Acad. Sci. USA **91**, 11621-11625, 1994. (Cited 135 times) PMID 7972114
 6. Zlatanova, J., Leuba, S. H., Yang, G., Bustamante, C. and van Holde, K. Linker DNA accessibility in chromatin fibers of different conformations: A re-evaluation. Proc. Natl. Acad. Sci. USA **91**, 5277-5380, 1994. (Cited 41 times) PMID 8202481
 7. Varga-Weisz, P., Zlatanova, J., Schroth, G. P., Leuba, S. H. and van Holde, K. Binding of histones H1 and H5 and their globular domains to four-way junction DNA. Proc. Natl. Acad. Sci. USA **91**, 3525-3529, 1994. (Cited 62 times) PMID 8170940
 8. Leuba, S. H., Zlatanova, J. and van Holde, K. On the locations of histones H1 and H5 in the chromatin fiber: Studies with immobilized micrococcal nuclease. J. Mol. Biol. **235**, 871-880, 1994. (Cited 6 times) PMID 8445656
 9. Leuba, S. H. A one-step preparative method to reconstitute linker histones onto linker histone-stripped chromatin fibers. Methods Mol. Cell. Biol. **6**, 125-133, 1997.
 10. Yaneva, J., Leuba, S. H., van Holde, K. and Zlatanova, J. The major chromatin protein histone H1 preferentially binds to cis-platinum damaged DNA. Proc. Natl. Acad. Sci. USA **94**, 13448-13451, 1997. (Cited 40 times) PMID 9391045
 11. Bustamante, C., Zuccheri, G., Leuba, S. H., Yang, G. and Samori, B. Visualization and analysis of chromatin by scanning force microscopy. Methods **12**, 73-83, 1997. (Cited 25 times) PMID 9169197
 12. Zlatanova, J., Yaneva, J. and Leuba, S. H. Proteins that specifically recognize cisplatin-damaged DNA: a clue to anticancer activity of cisplatin. FASEB J. **12**, 791-798, 1998. (Cited 78 times) PMID 9657519
 13. Zlatanova, J., Leuba, S. H. and van Holde, K. Chromatin fiber structure: morphology, molecular determinants, structural transitions. Biophys. J. **74**, 2554-2566, 1998. (Cited 58 times) PMID 9591681
 14. Leuba, S. H., Bustamante, C., Zlatanova, J. and van Holde, K. Contributions of linker histones and histone H3 to chromatin structure: Scanning force microscopy studies on trypsinized fibers. Biophys. J. **74**, 2823-2829, 1998. (Cited 30 times) PMID 9635736

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15. Leuba, S. H., Bustamante, C., van Holde, K. and Zlatanova, J. Linker histone tails and N-tails of histone H3 are redundant: scanning force microscopy studies of reconstituted fibers. *Biophys. J.* **74**, 2830-2839, 1998. (Cited 35 times) PMID 9635737
 16. An, W., Leuba, S. H., van Holde, K. and Zlatanova, J. Linker histone protects DNA on only one side of the core particle and in a sequence-dependent manner. *Proc. Natl. Acad. Sci. USA* **95**, 3396-3401, 1998. (Cited 31 times) PMID 9520377
 17. Liu, Y. Z., Leuba, S. H. and Lindsay, S. M. Relationship between stiffness and force in single molecule pulling experiments. *Langmuir* **15**, 8547-8548, 1999. (Cited 13 times)
 18. An, W., Zlatanova, J., Leuba, S. H. and van Holde, K. The site of binding of linker histone to the nucleosome does not depend upon the amino termini of core histones. *Biochemie* **81**, 727-732, 1999. (Cited 5 times) PMID 10492019
 19. Leuba, S. H., Karymov, M. A., Liu, Y. Z., Lindsay, S. M. and Zlatanova, J. Mechanically stretching single chromatin fibers. In *Gene Ther. Mol. Biol.*, Boulikas, T., Ed., Vol. **4**, 297-301, 1999.
 20. Leuba, S. H., Zlatanova, J., Karymov, M. A., Bash, R., Liu, Y. Z., Lohr, D. E., Harrington R. E. and Lindsay, S. M. The mechanical properties of single chromatin fibers under tension. *Single Mol.* **1**, 185-192, 2000. (Cited 15 times)
 21. Bennink, M. L., Leuba, S. H., Leno, G. H., Zlatanova, J., de Grooth, B. G. and Greve, J. Unfolding individual nucleosomes by stretching single chromatin fibers with optical tweezers. *Nature Struct. Biol.* **8**, 606-610, 2001. (Cited 62 times) PMID 11427891
 22. Bennink, M. L., Pope, L. H., Leuba, S. H., de Grooth, B. G. and Greve, J. Single chromatin fibre assembly using optical tweezers. *Single Mol.* **2**, 91-97, 2001. (Cited 13 times)
 23. Karymov, M. A., Tomschik, M., Leuba, S. H., Caiafa, P. and Zlatanova, J. DNA Methylation-dependent chromatin fiber compaction in vivo and in vitro: Requirement for linker histone. *FASEB J.* **15**, 2631-2641, 2001. (Cited 19 times) PMID 11726539
 24. Tomschik, M., Karymov, M. A., Zlatanova, J. and Leuba, S. H. The archaeal histone-fold protein HMf organizes DNA into bona fide chromatin fibers. *Struct. Fold. Des.* **9**, 1201-1211, 2001. (Cited 13 times) PMID 11738046
 25. An, W., Palhan, V. B., Karymov, M. A., Leuba, S. H. and Roeder, R. G. Selective requirements for histone H3 and H4 N-Termini in p300-dependent transcriptional activation from chromatin. *Mol. Cell* **9**, 811-821, 2002. (Cited 46 times) PMID 11983172
 26. Zlatanova, J. and Leuba, S. H. Stretching and imaging single DNA molecules and chromatin. *J. Muscle Res. Cell Motil.* **23**, 377-395, 2002. (Cited 7 times) PMID 12785092
 27. Zlatanova, J. and Leuba, S. H. Magnetic tweezers: a sensitive tool to study DNA and chromatin at the single-molecule level. *Biochem. Cell Biol.* **81**, 151-159, 2003. (Cited 5 times) PMID 12897848

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28. Zlatanova, J. and Leuba, S. H. Chromatin fibers, one-at-a-time. *J. Mol. Biol.* **331**, 1-19, 2003. ([Cited 20 times](#)) PMID 12875831
 29. Leuba, S. H., Karymov, M. A., Tomschik, M., Ramjit, R., Smith, P. and Zlatanova, J. Assembly of single chromatin fibers depends on the tension in the DNA molecule: magnetic tweezers study. *Proc. Natl. Acad. Sci. USA* **100**, 495-500, 2003. ([Cited 22 times](#)) PMID 12522259
 30. Tomschik, M., Zheng, H., van Holde, K., Zlatanova, J. and Leuba, S. H. Fast, long-range, reversible conformational fluctuations in nucleosomes revealed by spFRET. *Proc. Natl. Acad. Sci. USA* **102**, 3278-3283, 2005. Highlighted in *Biophotonics International* (March 2005 issue, p. 10). ([Cited 28 times](#)) PMID 15728351
 31. Pomerantz, R. T., Ramjit, R., Gueroui, Z., Place, C., Anikin, M., Leuba, S., Zlatanova, J. and McAllister, W. T. A tightly regulated molecular motor based upon T7 RNA polymerase. *Nano Lett.* **5**, 1698-1703, 2005. ([Cited 3 times](#)) PMID 16159208
 32. Zlatanova, J., William T. McAllister, W. T., Borukhov, S. and Leuba, S. H. Single-molecule approaches reveal the idiosyncrasies of RNA polymerases. *Structure* **14**, 953-966, 2006. ([Cited 1 time](#)) PMID 16765888
 33. Zheng, H., Goldner, L. S. and Leuba, S. H. Homebuilt scanning confocal fluorescence microscope for the study of DNA/protein interactions, one-at-a-time. *Methods* **41**, 342-352, 2007. PMID 17309845
 34. Anand, S. P., Zheng, H., Bianco, P., Leuba, S. H. and Khan, S. A. DNA helicase activity of PcrA is not required for the displacement of RecA from DNA and inhibition of RecA-mediated strand exchange. *J. Bacteriology* **189**, 4502-4509, 2007. PMID 17449621
 35. P. Rodriguez-Collazo, S. K. Snyder, R. C. Chiffer, J. Zlatanova, S. H. Leuba and C. L. Smith. cAMP Signaling Induces Rapid Loss of Histone H3 Phosphorylation in Mammary Adenocarcinoma-Derived Cell Lines. *Experimental Cell Research.* **314**, 1-10, 2008. PMID 17950276
 36. S. H. Leuba, S. P. Anand, J. M. Harp and S. A. Khan. Expedient placement of two fluorescent dyes for investigating dynamic DNA protein interactions in real time. *Chromosome Research* **16**, 451-467, 2008. PMID 18461484
 37. S. H. Leuba, T. B. Wheeler, C.-M Cheng, P. R. LeDuc, M. Fernández-Sierra, and E. Quiñones. Structure and dynamics of single DNA molecules as manipulated by magnetic tweezers and or flow. *Methods* **47**, 214-222, 2009. PMID 19015032
 38. P. Rodriguez-Collazo, S. H. Leuba, and J. Zlatanova. A robust method for histone purification and fractionation, preserving their native modifications. *Nucleic Acids Research*, **37**, e81, 2009. PMID 19443446
 39. C.-M. Cheng, Y.T. Kim, J.-M. Yang, S. H. Leuba & P. R. LeDuc (2009) Dynamics of individual polymers using microfluidic based microcurvilinear flow. *Lab Chip* **9**, 2339-2347. PMID: 19636465
 40. TM Erb, C Schneider, SE Mucko, JS Sanfilippo, NC Lowry, MN Desai, RS Mangoubi, SH Leuba, PJ Sammak (2011) Paracrine and Epigenetic Control of Trophectoderm Differentiation from Human

41. BW Graham, G Schauer, SH Leuba and M Trakselis (2011) Steric Exclusion and Wrapping of the Excluded DNA Strand Occurs Along Discrete External Binding Paths During MCM Helicase Unwinding. *Nucleic Acids Research.* 39:6585-95. PMID: 21576224.
42. L. Lan, S. Nakajima, M. G. Kapetanaki,, C. L. Hsieh, M. Fagerburg, K. Thickman, P. Rodriguez-Collazo, S. H. Leuba, A. S. Levine, and V. Rapic-Otrin (2012) Monoubiquitinated H2A destabilizes photolesion-containing nucleosomes with the concomitant release of the UV-damaged DNA-binding protein E3 ligase. *J. Biol. Chem.* 287:12036-49. PMID: 22334663.
43. Fagerburg, M., G. Schauer, K. Thickman, P. Bianco, S. Khan, S. H. Leuba, S. Anand (2012) PcrA-mediated disruption of RecA nucleoprotein filaments – essential role of the ATPase activity of RecA. *Nucleic Acids Research* 40:8416-24. PMID: 22743269.
44. Sanford H Leuba, Sean M Carney, Elizabeth M Dahlburg, Rebecca J Eells, Harshad Ghodke, Naveena Yanamala, Grant Schauer and Judith Klein-Seetharaman. (2014) Early integration of the individual student in academic activities: a novel classroom concept for graduate education in molecular biophysics and structural biology. *BMC Biophysics* 7:6 doi:10.1186/2046-1682-7-6. PMID: 25132964.
45. Grant D. Schauer, Kelly D. Huber, Sanford H. Leuba*, and Nicolas Sluis-Cremer. (2014) Mechanism of allosteric inhibition of HIV-1 reverse transcriptase revealed by single-molecule and ensemble fluorescence. *Nucleic Acids Research* 2015 Feb 1;42(18):11687-96. doi: 10.1093/nar/gku819. Epub 2014 Sep 17. PMID: 25232099 *Corresponding author.
46. Pastrana CL, Carrasco C, Akhtar P, **Leuba SH**, Khan SA, Moreno-Herrero F. (2016) Force and twist dependence of RepC nicking activity on torsionally-constrained DNA molecules. *Nucleic Acids Res.* 2016 Aug 3. pii: gkw689. [Epub ahead of print] PMID:27488190 DOI:10.1093/nar/gkw689

2) Books

1. S. H. Leuba and J. Zlatanova, Eds. (2001) *Biology at the single-molecule level*. Pergamon, Amsterdam, 250 pg. ISBN: 0-08-044031-2 (Book reviewed by Ishii, Y. and Yanagida, T. *Toward single molecule biochemistry. Cell* **109**, 686-688, 2002).
2. J. Zlatanova and S. H. Leuba, Eds. (2004) *Chromatin Structure and Dynamics: State-of-the-Art*. New Comprehensive Biochemistry Vol. 39, Elsevier, Amsterdam, 507 pg. ISBN: 0-444-515941.

3) Reviews, Invited Papers and Book Chapters:

1. Yang, G., Leuba, S. H. and Bustamante, C. Scanning force microscopy of chromatin fibers: A new approach to an old problem. *Biol. Struct. Dynamics* **1**, 155-172, 1995.
2. Leuba, S. H., Yang, G., Robert, C., van Holde, K., Zlatanova, J. and Bustamante, C. Extended chromatin fibers: Evidence from scanning force microscopy studies. *SPIE Proc.* **2384**, 33-44, 1995.

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3. Zlatanova, J., Leuba, S. H., Bustamante, C. and van Holde, K. Role of the structural domains of the linker histones and histone H3 in the chromatin fiber structures at low-ionic strength: SFM studies on partially trypsinized chromatin. *SPIE Proc.* **2384**, 22-32, 1995.
 4. Yang, G., Leuba, S. H., Bustamante, C., van Holde, K. and Zlatanova, J. Scanning force microscopy study of native and linker histone-depleted chromatin fibers. *SPIE Proc.* **2384**, 13-21, 1995.
 5. Leuba, S. H. and Zlatanova, J. Methods of reconstitution of linker histone onto oligonucleosomes. *Methods Mol. Cell. Biol.* **6**, 116-124, 1997.
 6. van Holde, K., Leuba, S. H. and Zlatanova, J. Physical approaches to the study of chromatin. In *Gene Ther. Mol. Biol.*, Boulikas, T., Ed., Vol. **1**, 475-482, 1999.
 7. Leuba, S. H. and Bustamante, C. Analysis of Chromatin by Scanning Force Microscopy. In *Methods in Molecular Biology*, Becker, P., Ed. **119**, 143-160, 1999. PMID 10804509
 8. Zlatanova, J., Leuba, S. H. and van Holde, K. Chromatin structure revisited. *Crit. Rev. Eukaryot. Gene Expr.* **9**, 245-255, 1999. (Cited 17 times) PMID 10651241
 9. Zlatanova, J., Lindsay, S. M. and Leuba, S. H. Single molecule force spectroscopy in biology using the atomic force microscope. *Prog. Biophys. Mol. Biol.* **74**, 37-61, 2001. (Cited 88 times) PMID 11106806
 10. Leuba, S. and Zlatanova, J. Single-molecule biochemistry coming of age. *Prog. Biophys. Mol. Biol.* **74**, V, 2001.
 11. Leuba, S. H. and Zlatanova, J. Single-molecule studies of chromatin fibers: a personal report. *Arch. Histol. Cytol.* **65**, 391-403, 2002. PMID 12680455
 12. Zlatanova, J. and Leuba, S. H. Chromatin structure and dynamics: lessons from single molecule approaches. In *Chromatin structure and dynamics: State of the Art.* (Zlatanova, J. and Leuba, S. H., Eds.) Elsevier, Amsterdam vol. **39**, 369-396, 2004. (Cited 1 time)
 13. Leuba, S. H., Bennink, M. L. and Zlatanova, J. Single molecule analysis of chromatin. In *Chromatin and Chromatin Remodeling Enzymes, Parts A and B.* *Methods Enzymol.* (C. Wu and C. D. Allis, Eds.) **376**, 73-105, 2004. (Cited 4 times) PMID 14975300
 14. Bennink, M. L., Leuba, S. H. and Zlatanova, J. Analysis of protein/DNA interactions by optical tweezers: application to chromatin fibers. In *Protein-protein interactions, a molecular cloning manual*, 2nd ed. (E. Golemis and P. Adams, Eds.) Cold Spring Harbor Laboratory Press, Cold Spring Harbor (by invitation) pp. 415-427, 2005.
 15. Zheng, H., Tomschik, M., Zlatanova, J. and Leuba, S. H. Evanescent field fluorescence microscopy (EFFM) for analysis of protein/DNA interactions at the single-molecule level. In *Protein-protein interactions, a molecular cloning manual*, 2nd ed. (E. Golemis and P. Adams, Eds.) Cold Spring Harbor Laboratory Press, Cold Spring Harbor pp. 429-444, 2005.
 16. S. H. Leuba and L. R. Brewer. 2009 Single-molecule studies of chromatin structure and dynamics. In *Single Molecule Biology*. A. Knight, Ed. Elsevier, Amsterdam pp. 143-171.

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17. S. H. Leuba and R. A. Steinman. 2011 How to think like a single molecule: obtaining quantitative measurements on single DNA molecules and chromatin fibers. *In* Biophysics of Protein-DNA Interactions. M. C. Williams and L. J. Maher, III, Eds. Springer, NY pp. 307-323.
 18. M. V. Fagerburg and S. H. Leuba. 2011 Optimal practices for surface-tethered single molecule total internal reflection fluorescence resonance energy transfer analysis. *In* DNA Nanotechnology. G. Zuccheri and B. Samori, Eds. Humana Press, Totowa, NJ Methods Mol Biol. 2011;749:273-289. PMID: 21674379.
 19. S. Uguroglu, O. Tastan, J. Klein-Seetharaman, and S. H. Leuba. 2011 Identification of potentially relevant citeable articles using association rule mining. *Medicinal Chemistry* 1:e101. doi:10.4172/2161-0444.1000e101.
 20. Grant Schauer, Sanford H. Leuba, Nicolas Sluis-Cremer. Biophysical insights into the inhibitory mechanism of nonnucleoside HIV-1 reverse transcriptase inhibitors. (2013) *Biomolecules* 3, 889-904; doi:10.3390/biom3040889. PMID: 24970195.
 21. P. Rodriguez-Collazo, S. Leuba, E. Karahanian and J. Zlatanova. Salt-urea, Sulfopropyl-Sepharose, and Covalent Chromatography Methods for Histone Isolation and Fractionation. (2014) *Methods in Molecular Biology* 1094:295-307. doi: 10.1007/978-1-62703-706-8_23..

4) Published Abstracts:

Sanford H Leuba, Ravi Ramjit, Miroslav Tomschik, Paul Smith, Jordanka Zlatanova. Following single chromatin fiber assembly and disassembly by magnetic tweezers. Platform Presentation at the Biophysical Society 2003 Annual Meeting, San Antonio, TX. Biophysical Society Meeting Abstracts. *Biophysical Journal*, Supplement, Abstract.

Chittanon Buranachai, Sanford Leuba, Charles P. Ordahl, Ernest Kun, Robert M. Clegg. Histone H1 and DNA Interaction Study Using Several Methods in Fluorescence Spectroscopy. Poster Presentation at the Biophysical Society 2004 Annual Meeting, Baltimore, MD. Biophysical Society Meeting Abstracts. *Biophysical Journal*, Supplement, Abstract.

Miroslav Tomschik, Haocheng Zheng, Ken van Holde, Jordanka Zlatanova, Sanford Leuba. Observation of fast, long-range, reversible conformational fluctuations in nucleosomes. Poster Presentation at the Biophysical Society 2005 Annual Meeting, Long Beach, CA. Biophysical Society Meeting Abstracts. *Biophysical Journal*, Supplement, Abstract.

H. Zheng, P. Rodriguez-Collazo, S. P. Anand, M. S. Kim, S. A. Khan, J. Zlatanova, S. H. Leuba. Single-molecule scanning confocal fluorescence microscope (SCFM) studies of dynamic protein/DNA interactions. Platform Presentation at the Biophysical Society 2006 Annual Meeting, Salt Lake City, Utah. Biophysical Society Meeting Abstracts. *Biophysical Journal*, Supplement, Abstract.

Pedro Rodriguez-Collazo, Miroslav Tomschik, Jordanka Zlatanova, Sanford H. Leuba. Isolation of natively modified histones in a single step from intact cells: antagonistic role of histone phosphorylation in nucleosome assembly. Poster Presentation at the Biophysical Society 2007 Annual Meeting, Baltimore, MD. Biophysical Society Meeting Abstracts. *Biophysical Journal*, Supplement, Abstract.

Mark E. Greene, Geoffrey M. Lowman, Syam P. Anand, Haocheng Zheng, Saleem Khan, Sanford Leuba, Lori S. Goldner. Mixing RecA, PcrA, and DNA Using Aqueous Droplets to Monitor Biochemistry with Single Molecule Fluorescence. Poster Presentation at the Biophysical Society 2007 Annual Meeting, Baltimore, MD. Biophysical Society Meeting Abstracts. Biophysical Journal, Supplement, Abstract.

Syam P. Anand, Haocheng Zheng, Piero R. Bianco, Sanford H. Leuba, Saleem A. Khan. PcrA DNA helicase can displace RecA from DNA without translocation. Poster Presentation at the Biophysical Society 2007 Annual Meeting, Baltimore, MD. Biophysical Society Meeting Abstracts. Biophysical Journal, Supplement, Abstract.

Grant Schauer, Nic Sluis Cremer and Sanford Leuba. PIFE studies of HIV RT. Poster Presentation at the Biophysical Society 2012 Annual Meeting, San Diego, CA. Biophysical Journal, Supplement, Abstract.

5) Journal and Book Covers:

Physics Today, December 1995.

Journal of Biological Chemistry, 27 June 2003.

Nature Structural Biology, July 2001.

Chromatin Protocols, Humana Press, Totowa, NJ, 1999.

Chromatin Structure and Dynamics, Elsevier, Amsterdam, 2004.

6) Figures in Textbooks:

Figure 16.5 in Principles of Physical Biochemistry, 2nd Ed., K. E. van Holde, W. C. Johnson and P. S. Ho. Pearson Educational, Upper Saddle River, NJ, 2006.

Figures from references # 9 and 21 above are reproduced as Figures FS.49 and FS.57 in Methods in Molecular Biophysics: Structure, Dynamics, Function. I. N. Serdyuk, N. R. Zaccai and J. Zaccai. Cambridge University Press, Cambridge, UK, 2007.

Figure 15.30 in Quantitative Understanding of Biosystems: An Introduction to Biophysics, Thomas M. Nordlund, by Taylor and Francis Group, LLC.

PROFESSIONAL ACTIVITIES

TEACHING:

a. Graduate Courses:

<i>Course</i>	<i>Lecture Hours</i>	<i>Tutorials or PBL Hour</i>	<i>Years Taught</i>
Department of Biological Sciences MCDB Core Course	3		Fall 2003

Department of Cell Biology and Physiology Core Course	3	Spring 2004
Normal and Disease States		
Molecular Biophysics I: Single Molecule Approaches	1	5 Dec. 2007
Molecular Biophysics I: Single Molecule Approaches	2	Fall, 2010, 2011, 2012, 2013
Molecular Biophysics II	6	Spring 2005
Molecular Biophysics III	3	Spring 2005
Co-Director (with Judith Klein-Seetharaman) Molecular Biophysics III (Experimental dynamics) Spring 2006, Spring 2007, Spring 2008, Spring 2009, Spring 2010, Spring 2011, Spring 2012. Director Spring 2013. Co-Director (with Patrick van der Wel) Spring 2014.		

Foundations of Biomedical Science: 4 lectures (Structure and function of DNA: 2 hours and Structure, function and dynamics of chromatin: 2 hours) October 2006; 3 hours, Single molecule approaches to molecular biology, October 2007, October 2008, October 2009.

b. Graduate Students/Visiting Graduate Students:

Satomi Nagao	October and November 2003
Atsuko Handa	October and November 2003
Min Sun Kim, B.S., M.S.	July 2004 to 2008
Matt Fagerburg, Ph.D.	September 2006 to December 2012 (recipient of NSF East Asia and Pacific Summer Institutes for U.S. Graduate Students (EAPSI) 2008)
Grant Schauer, Ph.D.	September 2008 to August 2013 (recipient of travel award to attend and present at Conference On Retroviruses And Opportunistic Infections (CROI) Atlanta, GA 2013; invited speaker, Annual Biophysical Society Meeting 2013, Nanoscale Biophysics Subgroup Meeting.

c. Research Assistant/Postdoctoral Fellows/Research Instructor/Research Assistant Professor:

Miroslav Tomschik, Ph.D.	4/1999-9/2004 (Tomschik received a \$25,000 Eppley Postdoc Fellowship)
Haocheng Zheng, Ph.D.	11/2002-9/2006
Nasrin Khajeh, B.S.	1/2004-10/2004
Pedro Rodriguez, Ph.D.	1/2005-6/2011 (Research Assistant Professor)
Karen Thickman, Ph.D.	9/2006-7/2010 (shared with Saleem Khan)
Syam P. Anand, Ph.D.	5/2006-6/2012 (shared with Saleem Khan)

d. Graduate Student advisor:

Hui Ma, Molecular Biophysics Program advisee 8/2004-12/2006
Harshad Ghodke, Molecular Biophysics Program advisee 8/2009-8/2010

e. Graduate Student Committee Member:

Ioanna Pagani, Ph.D. Candidate, Biomedical Engineering, CMU. Ph.D. received 2006.

Chair of Oral Comprehensive Exam of Kalyan Tirupula, Molecular Biophysics and Structural Biology Graduate Program, 6 September 2007.

Member of Oral Comprehensive Exam of James Thieman, Cell Biology and Physiology, October 2007.

Chair of Oral Comprehensive Exam of Adelajda Zorba, Molecular Biophysics and Structural Biology Graduate Program, September 2008.

Marcie Warywoda, Ph.D. Candidate, Biological Sciences. Ph.D. received 2008

Matthew L. Bochman, Ph.D. Candidate, Biological Sciences. Ph.D. received 2008.

Philip Morgan, Ph.D. Candidate, Chemistry. Ph.D. received 2010

Dongxiao Li, Ph.D. Candidate, Electrical Engineering. Ph.D. received 2011

Member of Oral Comprehensive Exam of Ben Kong, Molecular Biophysics and Structural Biology Graduate Program, 9 July 2013.

f. Undergraduate Student advisor:

Megan Eshbach and Matt Schmitt, University of Pittsburgh First Experiences in Research, Spring term 2011

1. RESEARCH

Active Research Support:

R01GM068406 (PI: Nic Sluis-Cremer) 2009 – 2018

NNRTI induced conformational changes in HIV-1 RT

The primary goal of this grant is to define the molecular mechanism(s) by which NNRTI inhibit HIV-1 reverse transcription. In addition, we propose to characterize a new class of RT inhibitor termed the template/primer competing RT inhibitor (TPcRTI). Because the TPcRTIs exhibit a novel mechanism of action, it is anticipated that, if developed, they will both complement and diversify existing HIV-1 therapeutic strategies, and more importantly, provide a new avenue for the treatment of multi-drug resistant HIV-1.

Submitted Research Support:

R01 Replication Helicase Assembly and Unwinding Mechanisms (PI: Trakselis; Role: co-investigator)
4/1/13-3/31/18

Completed Research Support:

R01GM077872 (PI) 5/1/2011-4/30/2012

Development of single-molecule approaches to the study of helicases at the nanoscale level

The overall objectives of this research are to develop novel uses and novel configurations of single-pair fluorescence resonance energy transfer and magnetic tweezers. We will develop these single-molecule approaches and use them to study the PcrA helicase to answer important questions concerning its DNA binding, translocation and unwinding activities.

R01GM077872 (PI) 5/01/2006 – 4/30/2011

Development of single-molecule approaches to the study of helicases at the nanoscale level

R01GM077872-04S1 ARRA Supplement \$272,000 9/30/2009-4/30/2011

NIH, K01 CA122177 (PI: Pedro Rodriguez-Collazo; Role: mentor) 9/7/2007-8/31/2012
Regulation of histone H3 dephosphorylation in breast cancer cells
Dr. Rodriguez-Collazo moved to a tenure-track Assistant Professor of Biochemistry position at Western
Osteopathic University in Lebanon, Oregon, effective 1 July 2011

R21CA125514 (PI: Richard Steinman; Role: co-investigator) 6/1/2007-5/31/2009
A Nucleosomal Biosensor for Identification and Isolation of Nuclear Hormone Receptor Ligands

F32 GM082132 (PI: Karen Thickman Role: co-mentor) 9/2007-2/2010
Intramolecular domain movements of PcrA during its helicase function

K22CA077871 (PI) 09/01/02-08/30/05
Probing single chromatin fiber structure and dynamics

NCI Scholar (PI) 9/01/98-08/31/02

Previous Research Support in Pittsburgh:

Rett Syndrome Research Foundation (Co-PI) 10/01/04-09/30/06
Single-molecule approaches to MeCP2 binding to nucleosomes

Emmerling (Co-PI) Pittsburgh Foundation 08/01/04-07/31/06
Unlocking the mechanism of MeCP2 in Rett Syndrome:the chromatin connection

UPCI Pilot (PI) 08/01/03-07/01/05
Single molecule studies of chromatin remodeling by nucleotide excision repair factors

PATENTS

1. P. Rodriguez-Collazo, S. H. Leuba and J. Zlatanova. Method of extracting chromatin fractions from intact cells (Provisional Patent Submitted 17 March 2006; resubmitted 15 March 2007).
2. R. Steinman and S. H. Leuba. Nucleosome-based biosensor. (Provisional Patent Submitted 21 March 2006). Unprotected March 2010.

2. Seminars and invited lectureships

- 1) Department of Biochemistry, North Carolina State University, 13 April 1995.
- 2) Department of Chemistry, Duke University, Durham, NC, 17 April 1995.
- 3) Eppley Institute for Research in Cancer, Omaha, NE, May 1996.
- 4) Centre de Microscopie électronique, Lausanne, Switzerland, 18 June 1996.
- 5) Max Planck Inst. for Biophys. Chemistry, Göttingen, Germany, 21 June 1996.
- 6) Biochemistry, University of Oklahoma Health Sciences Center, July 1996.
- 7) Department of Biol. Chem., University California Davis, 3 September 1996.

- 8) Biochemistry, Brandeis University, Waltham, MA, February 1997.
- 9) Department of Chemistry, Arizona State University, Tempe, AZ 19 May 1997.
- 10) Biophysical Society Annual Meeting, Kansas City, MO, February 1998.
- 11) National Cancer Institute, NIH, Bethesda, MD, March 1998.
- 12) Lab. Receptor Biology, National Cancer Institute, NIH, 17 June 1998.
- 13) The University of Mississippi Medical Center, Jackson, 14 January 1999.
- 14) Biophysical Society Annual Meeting, Baltimore, MD, 17 February 1999.
- 15) University of Twente, Enschede, The Netherlands, 15 – 22 April 1999.
- 16) Microscopy and Microanalysis '99, Portland, OR, 4 August 1999.
- 17) Laboratory Molecular Growth Regulation, NICHD, NIH, 30 September 1999.
- 18) National Institute Standards Technology, Gaithersburg, MD, 10 May 2000.
- 19) Microscopy and Microanalysis '00, Philadelphia, PA, 17 August 2000.
- 20) Department of Physics, University of Illinois at Chicago, 13 September 2000.
- 21) Biochemistry, Molecular Biology, Biophysics, Univ. Minn., 28 February 2001.
- 22) Division Therapeutic Proteins, Food Drug Admin., NIH, 27 April 2001.
- 23) Chem. Physics, Nat. Inst. Diabetes Digestive Kidney Diseases, 16 May 2001.
- 24) Division of Biophysics, NIH, Bethesda, MD, 1 June 2001.
- 25) Department of Physics, Univ. Illinois at Champaign-Urbana, 4 June 2001.
- 26) STM 2001, U. British Columbia, Vancouver, Canada, 18 July 2001.
- 27) Nanobiology Minisymposium, NIH Research Festival, 4 Oct. 2001.
- 28) Biochem., Wake Forest U. School Med., Winston-Salem, NC, 9 Oct. 2001.
- 29) Laboratory of Physical and Structural Biology, NICHD, NIH, 17 Oct. 2001.
- 30) Department of Chemistry, Boston University, 29 Nov. 2001.
- 31) Biochemistry & Molecular Biology, Finch Chicago Medical Sch., 6 Dec. 2001.
- 32) Physiology & Biophysics, Albert Einstein College of Medicine, 13 Dec. 2001.
- 33) Boston Biomedical Research Institute, 3 Jan. 2002.
- 34) Molecular and Cellular Biology, University of California Davis, 7 Jan. 2002.
- 35) Chemistry, University of South Carolina, Columbia, SC, 15 Jan. 2002.
- 36) Biochem. & Mol. Biol., University of Miami School of Medicine, 21 Jan. 2002.
- 37) Biomedical Engineering, Indiana University, Indianapolis, IN, 1 Feb. 2002.
- 38) Biotechnology, University British Columbia, Vancouver, Canada, 4 Feb. 2002.
- 39) Cell Biology & Physiology, Univ. Pittsburgh School of Medicine, 11 Feb. 2002.
- 40) Biochemistry, Dental School, Univ. Penn, Philadelphia, PA, 13 Feb. 2002.
- 41) Biochemistry & Molecular Biology, St. Louis University, MO, 19 Feb. 2002.
- 42) Institute Jacques Monod, University of Paris VII, France, 15 March 2002.
- 43) Mathématique et Physique pour la Génomique, Arcachon, France, 3-23-02.
- 44) Department of Physics, Univ. Illinois at Champaign-Urbana, 12 August 2002.
- 45) National Institute of Food Research, Tsukuba, Japan, 8 October 2002.
- 46) International Symposium on Chromatin Research in the Nano-era, Niigata, Japan, 9-11 October 2002.
- 47) Brooklyn Polytechnic University, Brooklyn, NY, 14 January 2003.
- 48) Pittsburgh Chromatin Club, 27 January 2003.
- 49) Biophysical Society Annual Meeting, San Antonio, TX, 3 March 2003.
- 50) Chromatin Structure and Function, Penn State Summer Symposium in Mol. Biol., 31 July 2003.
- 51) Penn State College of Medicine, Biochemistry & Molecular Biology, Hershey, PA, 3 November 2003.
- 52) Cell Biology and Physiology, University of Pittsburgh School of Medicine, 3 March 2004.
- 53) Biomedical Engineering, Carnegie Mellon University, Pittsburgh, PA, 29 April 2004.
- 54) Fox Chase Cancer Center, Philadelphia, PA, 25 May 2004.
- 55) Single Molecule Biophysics, Aspen Physics Institute, 5 January 2005.

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- 56) Biomedical Informatics, Ohio State University, Columbus, OH, 25 January 2005.
 - 57) Human Genetics, University of Pittsburgh School of Medicine, Pittsburgh, PA 4 March 2005.
 - 58) Special lecture series for graduate students in Biochemistry, Cellular & Molecular Biology, University Tennessee Knoxville, 9-10 March 2005.
 - 59) Physics, Drexel University, Philadelphia, PA, 19 May 2005.
 - 60) Cell Biology, School of Osteopathic Medicine, UMDNJ, Stratford, NJ, 20 May 2005.
 - 61) Declined invitation. Joint 12th International Congress Biorheology and 5th International Conference on Clinical Hemorheology, Chongqing, China, 30 May-3 June 2005.
 - 62) University of Pittsburgh Cancer Institute, Hillman Cancer Center, 7 June 2005.
 - 63) Rutgers University, Piscataway, NJ, 10-11 November 2005.
 - 64) Biophysical Society Annual Meeting platform session, Salt Lake City, UT, 22 Feb. 2006.
 - 65) Structural Biology, University of Pittsburgh School of Medicine, 2 March 2006.
 - 66) Computational Biology, University of Pittsburgh School of Medicine, 17 April 2006.
 - 67) Physics, Optics Division, National Institute Standards and Technology, Gaithersburg, MD, 22 May 2006.
 - 68) Biological Sciences, Carnegie Mellon University, Pittsburgh, 20 Sept. 2006
 - 69) Science 2006, Molecular Machines, Pittsburgh, 5 October 2006.
 - 70) Senior Vice Chancellor Research Seminar, University of Pittsburgh School of Medicine, 15 Dec 2006.
 - 71) Michigan Center for Theoretical Physics, University of Michigan, Ann Arbor, MI 11-13 June 2007.
 - 72) Penn State Summer Symposium in Molecular Biology, University Park, PA, 19-22 June 2007.
 - 73) Active Motif, Carlsbad, California, 29 June 2007.
 - 74) Department of Chemistry, University of Puerto Rico, 23-27 January 2008.
 - 75) University of Bologna, Italy, 9 May 2008.
 - 76) University of Genoa, Italy, 16 May 2008.
 - 77) American Society of Cell Biology, San Francisco, 13 December 2008.
 - 78) European Biophysical Society, Genoa, Italy, 12 July 2009.
 - 79) Biomechanic's Day, Carnegie Mellon University, Pittsburgh, 22 September 2009.
 - 80) Science 2009, Single Molecule Techniques, Pittsburgh, 16 October 2009.
 - 81) Pittsburgh Chromatin Club Minisymposium, 4 December 2009.
 - 82) Genomics and Proteomics Core Laboratories Minisymposium, University of Pittsburgh, 21 January 2010.
 - 83) Italian Institute of Technology, Genoa, Italy 7 July 2010.
 - 84) Pittcon, Orlando, Florida, 11 March 2012.
 - 85) International Plasmid Biology Meeting, Santander, Spain, 12-16 September 2012.
 - 86) CSIC, Madrid, Spain, 18 September 2012.
 - 87) Monie Ferst Award Symposium of Sigma Xi at Georgia Tech University in Honor of Ken van Holde, Atlanta, 9 November 2012.
 - 88) Guoliang Yang Memorial Symposium, Drexel University, 1 February 2013.
 - 89) DKFZ, German Cancer Research Foundation, Heidelberg, Germany, 19 April 2013.
 - 90) IX International Interdisciplinary Scientific Research Congress (IX CIC), Santo Domingo, Dominican Republic, 13-14 June 2013.
 - 91) Institute of Biophysics, Indian Academy of Sciences, Bangalore, India, November 2013.
 - 92) X International Interdisciplinary Scientific Research Congress (IX CIC), Santo Domingo, Dominican Republic, 12-13 June 2014.
 - 93) Cell Biology Annual Retreat, University of Pittsburgh 19 September 2014.

3. Other research related activities.

Co-editor of two issues (January and June 2001), *Progress in Biophysics and Molecular Biology*
Co-organizer: International meeting on “Chromatin Structure and Dynamics: State-of-the-Art” at NIH 8-10 May 2002 with 35 speakers (review by E. M. Bradbury *Mol. Cell* **10**, 13-19, 2002)
Co-chair of Biophysics Society Meeting “Single Molecule Biophysics” platform session, San Antonio, TX, 3 March 2003
Declined invitation 9/2004 from series editor John M. Walker to edit “Single Molecule Analysis” volume for *Methods in Molecular Biology*, Humana Press
Ad hoc referee: *Biochemistry*, *Biophysical J.*, *BMC Biochemistry*, *Int. J. Mol Sci*, *J. Royal Society Interface*, *J. Biol. Chem.*, *J. Mol. Biol.*, *Micron*, *Molecular Cell*, *Molecular Pharmacology*, *Nature*, *Nature Methods*, *Nature Structural and Molecular Biology*, Wellcome Trust, NSF, *Fundamenteel Onderzoek der Materie-NWO Physics-The Netherlands*, *Academica Sinica (Taiwan)*
Co-chair of Biophysics Society Meeting “Single Molecule Biophysics” platform session, Salt Lake City, UT, 22 Feb. 2006
Ad hoc member of the Nanoscience and Nanotechnology in Biology and Medicine Study Section (Mike Radtke, CSR), 27-28 July 2006
Ad hoc member of the Advisory Panel for the NSF Instrument Development for Biological Research (Helen Hansma, Program Officer), 11-12 January 2007
Ad hoc member of the MSFC Study Section (Denise Beusen, CSR), 6-7 February 2009
Ad hoc member of the NSF Study Section on Gene Regulation and Epigenetics
10/13/2010 to 10/15/2010
Co-chair of Nanoscale Biophysics Subgroup Meeting of the Biophysical Society Baltimore 5 March 2011
Co-chair of session on Nucleic acid and chromatin structure & function, European Biophysics Society Meeting, Budapest, Hungary, 23-27 August 2011
Section Editor, *BMC Biophysics*
Chair of Nanoscale Biophysics Subgroup Meeting of the Biophysical Society San Diego, 25 Feb 2012
Co-Chair, Guoliang Yang Memorial Symposium, Drexel University, Philadelphia, PA, 1 February 2013

SERVICE:

1. University and Medical School:

University Molecular Biophysics and Structural Biology Graduate Program (spearheaded by Dr. John Rosenberg, and now with Dr. Angela Gronenborn, Director): Admissions Committee, 2003-present; Chair of Admissions since 2012; Curriculum Committee, Spring 2009-present.

Co-organizer with Dr. Karen Arndt (Biological Sciences) of the Pittsburgh Chromatin Club Minisymposium with 5 local speakers giving 30 minute talks and one outside speaker giving a 45-60 minute talk (10 Dec. 2004 featuring outside speaker Shiv Grewal, NIH; 6 May 2005 featuring Mitch Smith, U. Virginia, Charlottesville; 9 Dec. 2005 featuring Jeff Parvin, Harvard Med. Sch.; 5 May 2006 featuring Jim Pipas; 8 December 2006 featuring Gary Felsenfeld, NIH; 4 May 2007 featuring Bill Bonner, NIH; 7 December 2007 featuring Yang Shi, Harvard; 2 May 2008 featuring David Spector, Cold Spring Harbor Laboratory; 5 December 2008 featuring Frank Pugh, Penn State Univ.; 1 May 2009 featuring Yuan Chang, U. Pittsburgh; 4 December 2009, featuring Bob Kingston, Harvard Med. School and Ronen Marmorstein, Wistar Institute); 30 April 2010 featuring Toshio Tsukiyama (Fred Hutchinson Cancer Research Center), December 2010 featuring Sergei Grigoryev (Penn State Hershey), 2 December 2012 featuring Antoine van Oijen (Groningen, The Netherlands), 2 May 2012 featuring Vasily Studitsky, UMDNJ, 7 December 2012 featuring Sterling Churchman, Harvard, 3 May 2013 featuring

Song Tan, Penn State and 6 December 2013 to be featuring Michelle D. Wang, Cornell. We receive funding from Abcam for these Minisymposia series.

I have hosted a number of Cell Biology and Physiology seminars such as David Bazett-Jones (Hospital for Sick Children, Toronto), Paul Selvin (Champaign-Urbana), Robert Singer (6 November 2007) (Albert Einstein College of Medicine), Molecular Biophysics and Structural Biology seminars: Dieter Braun (Rockefeller) and Steven B. Smith (Berkeley), Computational Biology seminar: Thomas Bishop (Tulane), and UPCI Basic Research seminars: Robert Singer (5 November 2007), Ray Reeves (WSU) and Woojin An (USC).

I organize a “Helicases and Other Molecular Motors” meeting during the academic year 2006- 2012 with participation from Saleem Khan (MGB), Patricia Opresko (Environ. and Occupational Health), Dan Cole (Mechanical Engineering and Materials Science), Michael Trakselis (Chemistry) and members of their respective laboratories. We have also had participation from Tony Schwacha (Biological Sciences), Yuri Nikiforov (Pathology), Chakra Chennubhotla (Computational Biology), Nic Sluis-Cremer (Medicine), Andy VanDemark (Biological Sciences), Guillermo Calero (Structural Biology), Peijun Zhang (Structural Biology), and Marcel Bruchez (Chemistry, CMU).

2. Community:

Each spring for three years (2009, 2010, 2011), my laboratory taught a class of fourth graders how to make speakers from Styrofoam plates as part of their understanding of electromagnetism. In 2011, volunteers from my lab taught genetics to a class of six graders, and in 2013, I organized a tour of the Hillman Cancer Center by 30 sixth graders with the participation of Professors Yuan Chang, Yang Liu, and Vesna Ropic-Otrin.

I assisted with Active Motif’s donating \$1000 to the Pittsburgh Science 2009 research symposium.