

Xuefeng Wang

Associate Professor
University of Cincinnati
College of Medicine

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PROFESSIONAL EXPERIENCE

Associate Professor, 08/2023 – Present

Hoxworth Blood Center, College of Medicine, University of Cincinnati, OH

Associate Professor, 01/2020 – 07/2023

Department of Physics, Iowa State University, Ames, IA

Assistant Professor, 08/2015 – 12/2019

Department of Physics, Iowa State University, Ames, IA

EDUCATION AND TRAINING

Postdoctoral Fellow, 05/2010 – 07/2015

Department of Physics, University of Illinois at Urbana-Champaign, Urbana, IL

Advisor: Dr. Taekjip Ha

- Developed Tension Gauge Tether for integrin molecular tension measurement and control.
- Extended single-molecule pull-down (SiMPull) to single cell level.

Ph.D. Physics, 09/2004 – 12/2009

Purdue University, West Lafayette, IN

Thesis: *Thin film analysis by Picometrology*

Advisor: Dr. David D. Nolte

- Developed three optical biosensors and imaging systems for protein microarray detection.
- Invented Picometrology for optical analysis of ultra-thin films.

M.S. Physics, 09/2001 – 07/2004

Tsinghua University, Beijing, China

Advisor: Dr. Hui Ma

- Developed a two-photon fluorescence anisotropy imaging system.

B.S. Physics, 09/1997 – 09/2001

Tsinghua University, Beijing, China

MEMBERSHIPS

Member of Biomedical engineering Society
Member of Biophysics Society
Member of American Society for Cell Biology
Member of American Physical Society
Member of Optical Society of America

HONORS

Maximizing Investigators' Research Award by NIH	2018-2023
CPLC Postdoctoral Fellowship sponsored by NSF	2010-2014
The Bilsland Dissertation Fellowship	2009
Kirk Endowment Exploratory Research Recharge Grants	2009
H. Y. Fan Award for outstanding research in condensed matter physics	2009

EDITORIAL ACTIVITIES

Reviewers for following journals

*Angewandte Chemie PNAS Applied Physics letters Optics Express Optics letters
Bioelectronics & Biosensors Nanotechnology Developmental Cell Science Advances
Nature Communications*

PATENTS (AS THE PRIMARY INVENTOR)

- System with extended range of molecular sensing through integrated multi-modal data acquisition. Issued Patent Number: US 7659968 (Commercialized by Perfinity Biosciences, Inc.)
- Method and apparatus for conjugate quadrature interferometric detection of an immunoassay. Issued Patent Number: US 7787126 (Licensed to and Commercialized by Perfinity Biosciences, Inc.)
- Balanced-quadrature interferometric protein microarray. WIPO Patent Publication number: WO/2010/039147

CURRENT FUNDING

Funding Agency: National Institutes of General Medical Sciences

Mechanism: Maximizing Investigators' Research Award for Early Stage Investigators (R35)

Title: Study the role of integrin tension in cell migration, platelet contraction and invadopodium dynamics

Period: 08/01/2018 - 07/30/2024 (No-cost extended)

Fund: \$1,845,555.00

Role: Single PI

Funding Agency: National Science Foundation

Mechanism: Cell Mechanics and Mechanobiology

Title: Study of the regulative role of integrin tension in the formation and function of plasma membrane protrusions in cancer cells

Period: 09/01/2018 - 08/31/2023

Fund: \$371,028.00

Role: Single PI

Funding Agency: National Science Foundation

Mechanism: CBET - BIOSENSING

Title: Platelets on Chip: Studies of Mechanobiology of Platelet-Mediated Thrombosis Enabled by Molecular Fluorescence Sensors Grafted Inside Microfluidic Chips

Period: 09/01/2022 - 08/31/2025

Fund: \$492,076.00

Role: Co-PI

COMPLETED FUNDING

Office of Biotechnology at Iowa State University

Mechanism: McGee-Wagner Interdisciplinary Research Fund

Title: Developing a single-platelet force assay to assess platelet function

Period: 02/01/2018 - 01/30/2021

Total Fund Awarded: \$30,000 (\$10,000 to Wang Lab)

Role: Leading PI (Co-Investigators: Dana LeVine, Long Que)

PUBLICATIONS

1. J. Austin, Y. Tu, K. Pal and X. Wang, “Vinculin transmits high-level integrin tensions which are dispensable for focal adhesion formation”, *Biophysical Journal*, 122, 1–12, (2022)
2. Y. Tu, K. Pal, J. Austin and X. Wang, “Filopodial adhesive force in discrete nodes revealed by integrin molecular tension imaging”, *Current Biology*, 32, 1–11 (2022) (IF: 10.83)
3. K. Pal, Y. Tu and X. Wang, “Single-molecule force imaging reveals that podosome formation requires no extracellular integrin-ligand tensions or interactions”, *ACS Nano*, 16, 2, (2022) (IF: 18.03)
4. Y. Tu and X. Wang, "Tracking cell migration by cellular force footprint recorded with a mechano-optical biosensor", *Biosensors and Bioelectronics*, 193 (113533), (2021) (IF:12.54)
5. S. Mao*, A. Sarkar*, Y. Wang, C. Song, D. N. LeVine, X. Wang** and L. Que**, "Microfluidic chip grafted with integrin tension sensors for evaluating the effects of flowing shear stress and ROCK inhibitor on platelets", *Lab on a chip*, (2021). ** Co-corresponding authors. (IF: 7.5)
6. K. Pal, Y. Zhao, Y. Wang and X. Wang, “Ubiquitous membrane-bound DNase activity in podosomes and invadopodia”, *Journal of Cell Biology*, 220, 7, (2021) (IF:10.54)
7. Y. Tu and X. Wang, “Recent Advances in Cell Adhesive Force Microscopy”, *Sensors*, 20, 24, (2020) (IF: 3.6)
8. A. Sarkar, D. N. LeVine, N. Kuzmina, Y. Zhao and X. Wang, “Cell migration driven by self-generated integrin ligand gradient on ligand-labile surfaces”, *Current Biology*, 30, 1-11, (2020) (IF: 10.83)
9. Y. Zhao, K. Pal, Y. Tu and X. Wang, “Cellular force nanoscopy with 50 nm resolution based on integrin molecular tension imaging and localization”, *Journal of the American Chemical Society*, 142, 15, 6930-6934, (2020) (IF: 16.38)
10. Y. Zhao, A. Sarkar and X. Wang, “Peptide nucleic acid based tension sensor for cellular force imaging with strong DNase resistance”, *Biosensors and Bioelectronics*, 150(111959), (2020) (IF:12.54)
11. Y. Zhao, N. Wetter and X. Wang, “Imaging integrin tension and cellular force at submicron resolution with integrative tension sensor”, *Journal of Visualized Experiments*, (146), e59476, (2019)
12. Y. Wang, Y. Zhao, A. Sarkar, X. Wang, “Optical sensor revealed abnormal nuclease spatial activity on cancer cell membrane”, *Journal of Biophotonics*, 12(5), (2019)
13. Y. Zhao, Y. Wang, A. Sarkar and X. Wang, “Keratocytes Generate High Integrin Tension at the Trailing Edge to Mediate Rear De-adhesion during Rapid Cell Migration”, *iScience*, 9:502-512, (2018)
14. A. Sarkar, Y. Zhao, Y. Wang and X. Wang, “Force-activatable coating enables high-resolution cellular force imaging directly on regular cell culture surfaces”, *Physical Biology*, 15, 065002 (2018)
15. X. Wang, S. Park, L. Zeng, A. Jain and T. Ha, “Towards single-cell single-molecule pull-down”, *Biophysical Journal*, 115, 283-288, (2018)
16. Y. Wang, D. N. LeVine, M. Gannon, Y. Zhao, A. Sarkar, B. Hoch and X. Wang, “Force-

- activatable biosensor enables single platelet force mapping directly by fluorescence imaging”, *Biosensors and Bioelectronics*, 100, 192-200, (2018)
17. Y. Wang and X. Wang, “Integrins outside focal adhesions transmit tensions during stable cell adhesion”, *Scientific Reports*, 36959, (2016)

Prior to ISU

18. Z. Rahil, S. Pedron, X. Wang, T. Ha, B. Harley and D. Leckband, Nanoscale mechanics guides cellular decision making. *Integrative Biology*, 8 (9):929-35 (2016)
19. F. Chowdhury, I. T. S. Li, T. T. M. Ngo, B. J. Leslie, B. C. Kim, J. E. Sokoloski, E. Weiland, X. Wang, Y. R. Chemla, T. M. Lohman, T. Ha, "Defining Single Molecular Forces Required for Notch Activation Using Nano Yoyo" *Nano Letters*, 16(6), 3892-2897 (2016)
20. X. Wang, Z. Rahil, I. T. S. Li, F. Chowdury, D. Leckband, Y. Chemla and T. Ha, “Constructing modular and universal single molecule tension sensor using protein G to study mechano-sensitive receptors”, *Scientific Reports*, 6, 21584 (2016)
21. M. K. Lee, J. Park, X. Wang, M. Roein-Peikar, E. Ko, E. Qin, J. Lee, T. Ha and H. Kong, “Rupture force of cell adhesion ligand tethers modulates biological activities of a cell-laden hydrogel”, *Chemical Communications*, 52, 4757, (2016)
22. M. Roein-Peikar, Q. Xu, X. Wang, and T. Ha, “Ultrasensitivity of Cell Adhesion to the Presence of Mechanically Strong Ligands”, *Physical Review X*, 6, 011001, (2016)
23. X. Wang*, J. Sun, Q. Xu, F. Chowdury, M. Rokhai, Y. Wang and T. Ha, “Integrin Molecular Tension within Motile Focal Adhesions”, *Biophysical Journal*, 109, 2259–2267, (2015)
*Corresponding Author.
24. F. Chowdhury, I. T. S. Li, B. J. Leslie, S. Doganay, R. Singh, X. Wang, J. Seong, S. H. Lee, S. Park, N. Wang and T. Ha, "Single molecular force across single integrins dictates cell spreading", *Integrative Biology*, 7, 1265-1271 (2015)
25. X. Wang and T. Ha, “Defining Single Molecular Forces Required to Activate Integrin and Notch Signaling”, *Science*, 340, 991-994 (2013).
26. X. Wang, M. Zhao, and D. D. Nolte, “Molecular layer detection on a diffractive optical balance”, *Optics Letters*, 37, 4098-4100 (2012).
27. X. Wang, M. Zhao, D. D. Nolte, and T. L. Ratliff, “Prostate specific antigen detection in patient sera by fluorescence-free BioCD protein array”, *Biosensors & Bioelectronics*, 26, 1871-1875 (2011).
28. X. Wang, M. Zhao, and D. D. Nolte, “Refractive index and dielectric constant transition of ultra-thin gold from cluster to Film”, *Optics Express*, 18, 24859-24867 (2010).
29. M. Zhao, X. Wang, and D. D. Nolte, “Mass-transport limitations in spot-based microarrays”, *Biomedical Optics Express*, 1, 983-997 (2010).
30. X. Wang, M. Zhao, and D. D. Nolte, “Ambient Molecular Water Accumulation on Silica Surfaces Detected by a Reflectance Interference Optical Balance”, *Applied Physics Letters*, 97, (2010).
31. X. Wang, M. Zhao, and D. D. Nolte, “Optical contrast and clarity of graphene on an arbitrary

- substrate”, *Applied Physics Letters*, 95, 081102 (2009). This paper has been also selected for *Virtual Journal of Nanoscale Science & Technology*.
32. X. Wang, M. Zhao, and D. D. Nolte, "Prostate-specific antigen immunoassays on the BioCD," *Analytical and Bioanalytical Chemistry*, 393, 1151-1156 (2009).
 33. D. D. Nolte, M. Zhao and X. Wang, The BioCD: High-Speed Interferometric Optical Biosensor, *Integrated Analytical Systems*, Juneeer-Verlag New York, (2009)
 34. X. Wang, Y. P. Chen, and D. D. Nolte, "Strong anomalous optical dispersion of graphene: complex refractive index measured by Picometrology," *Optics Express*, 16, 22105-22112 (2008).
 35. X. Wang, M. Zhao, and D. D. Nolte, "Land-contrast self-referencing interferometric protein microarray," *Applied Physics Letters*, 93, (2008).
Selected in Research Highlights, "Protein Interference", *Nature Physics*, 5, 9 (2009)
 36. X. Wang, M. Zhao, and D. D. Nolte, "Area-scaling of interferometric and fluorescent detection of protein on antibody microarrays," *Biosensors & Bioelectronics*, 24, 981-987 (2008).
 37. X. Wang, M. Zhao, and D. D. Nolte, "Combined fluorescent and interferometric detection of protein on a BioCD," *Applied Optics*, 47, 2779-2789 (2008).
 38. M. Zhao, X. Wang, and D. D. Nolte, "Molecular interferometric imaging," *Optics Express*, 16, 7102-7118 (2008).
 39. X. Wang, M. Zhao, and D. D. Nolte, "Common-path interferometric detection of protein monolayer on the BioCD," *Applied Optics*, 46, 7836-7849 (2007).
 40. X. Wang, Y. Wang, Y. Jiang, and H. Ma, "Two-photon fluorescence anisotropy imaging," *Progress in Biochemistry and Biophysics*, 32, 161-167 (2005).
 41. Y. Jiang, Y. Wang, Y. Hao, X. Wang, Q. Y. Qiu, Q. F. Wang and H. Ma, "Effect of berberine on the proliferation of human pulmonary carcinoma cells," *Chinese Journal of Pathophysiology* 21, 2170-2173 (2005).
 42. Y. Jiang, Y. Wang, Y. Hao, X. Wang, Q. Y. Qiu and H. Ma, "Effect of berberine on human lung cancer cells and human umbilical vein endothelial cell adhesion," *Chinese Journal of Pathophysiology* 19, 1577 (2003).
 43. C. Wang, X. Z. Li, J. L. Sang, X. Wang and H. Ma, "Study arsenic trioxide (As₂O₃) induced the apoptosis of squamous cell carcinoma," *Journal of Clinical Dermatology* 32, 181-183 (2003).

TALKS AND CONFERENCE PRESENTATIONS

1. X. Wang, “Imaging cell adhesive force at nanoscale with single molecule sensitivity”, University of Cincinnati, OH, 2022 (**Invited Talk**)
2. X. Wang, “Super-resolution Cell-matrix Force Imaging Enabled by Cellular Force Nanoscopy”, Biomedical Engineering Society meeting, Orlando, FL, 2021
3. X. Wang, “Super-resolution imaging of integrin tensions by cellular force nanoscopy”, Germany, 2021 (**Invited Talk**)
4. X. Wang, “DNase Activity in Podosomes and Invadopodia”, Intramural labs in National Institute of Aging, Baltimore, MD, 2021 (**Invited Talk**)
5. X. Wang, “Imaging Cellular Forces with Nucleic Acid-based Tension Sensors”, 3rd International Conference on Biosensors & Bioelectronics, Paris, France, 2020 (**Invited Talk**)
6. X. Wang, “Cell membrane transmits high-level integrin tensions for rear de-adhesion during rapid cell migration”, International Conference on Cell and Experimental Biology, Boston, 2020 (**Invited Talk**)
7. X. Wang, “Mapping single platelet forces directly by fluorescence imaging”, International Conference on Biomechanics and Medical Engineering, San Diego, 2019 (**Invited Talk**)
8. X. Wang, “Study integrin molecular tension in cell adhesion, migration and platelet contraction”, The Ohio State University, 2019 (**Invited Talk**)
9. X. Wang, Yongliang and Dana LeVine, “Cell membrane generates 50-100 pN integrin tension to mediate cell rear de-adhesion during rapid cell migration”, Biomedical Engineering Society meeting, Atlanta, GA, 2018 (Oral presentation)
10. X. Wang, “Using nano-sensor to characterize integrin molecular tension mediating cell rear de-adhesion”, Nano@IAState Meeting, Ames IA 2018 (**Invited Talk**)
11. X. Wang, “Measuring and Mapping integrin molecular tension that mediates cell rear de-adhesion”, 5th Midwest Single Molecule Workshop, Ames, IA 2018 (Oral presentation)
12. X. Wang, “Study integrin molecular tension in cell adhesion, migration and platelet contraction”, University of North Iowa, 2018 (**Invited Talk**)
13. X. Wang, Yongliang and Dana LeVine, “Calibrating and mapping integrin molecular tensions in single platelets”, Biomedical Engineering Society meeting, 2017 (Oral presentation)
14. X. Wang, Yongliang and Dana LeVine, “High-Resolution Integrin Molecular Tension Dynamics during Platelet Adhesion and Activation”, Biophysics Society meeting, New Orleans, NY 2017 (Oral presentation)
15. X. Wang, “Cell Mechanics: Quantification and visualization of integrin molecular tensions during cell adhesion, migration and platelet activation”, University of Iowa, 2017 (**Invited talk**)
16. X. Wang, “Co-existence of integrin tension inside and outside focal adhesions”, 4th Midwest Single Molecule Workshop, Iowa City, 2017 (Oral Presentation)
17. X. Wang and Yongliang Wang, “Two distinct regimes of integrin molecular forces”, Aspen winter conference: Physics of Development and Disease, Aspen, CO 2016
18. X. Wang, “Cellular Forces Studied by DNA-based Molecular Force Sensor & Modulator”,

- Massachusetts Institute of Technology, Department of physics, Cambridge, MA (Interview talk, 2015)
19. X. Wang, "Cellular Forces Studied by DNA-based Molecular Force Sensor & Modulator", Cornell University, Department of applied & engineering physics, Ithaca, NY (Interview talk, 2015)
 20. X. Wang, "Cellular forces measured and perturbed at the molecular level", Cornell University, Department of applied & engineering physics, Evanston, IL (Interview talk, 2015)
 21. X. Wang and T. Ha, "Measure the molecular tension required for integrin and Notch activation using Tension Gauge Tether", Exciting Biologies - Forces in biology, Dublin, Ireland (Oral talk, 2012)
 22. X. Wang and T. Ha, "In Situ SiMPull for Single Cell Analysis", American Society for Cell Biology Annual Meeting, San Francisco, CA (2012)
 23. X. Wang, M. Zhao, and D. D. Nolte, "Molecular water accumulation on silica measured with picometer height resolution," Conference on Lasers and Electro-Optics, Baltimore, MA (Oral talk, 2010).
 24. X. Wang, and D. D. Nolte, "Protein detection on an optical balance diffraction grating," APS March meeting, Portland, Oregon (Oral talk, 2010)
 25. X. Wang, M. Zhao, and D. D. Nolte, "Insulator-to-metal Transition of Gold Films Observed by Interferometric Picometry," Conference on Lasers and Electro-Optics, Baltimore, MA (Oral talk, 2009).
 26. X. Wang and D. D. Nolte, "Complex refractive index of graphene measured by picometry," APS March meeting, Pittsburgh, PA (Oral talk, 2009)
 27. X. Wang, M. Zhao, and D. D. Nolte, "A novel concept for protein microarray: Land-contrast BioCD," Photonics West, San Jose, CA (Oral talk, 2009)
 28. X. Wang, and D. D. Nolte, "Picometry of Ultra-thin Gold Film by Spinning-Disc Interferometry," Conference on Lasers and Electro-Optics, San Jose, CA (Oral talk, 2008).
 29. X. Wang, M. Zhao, and D. D. Nolte, "Multiplexed BioCD for prostate specific antigen detection" Photonics West, San Jose, CA (Oral talk, 2008)
 30. X. Wang, and D. D. Nolte, "The Bragg Side-Band BioCD," Conference on Lasers and Electro-Optics, Baltimore, MA (Poster, 2007).
 31. X. Wang, M. Zhao, and D. D. Nolte, "Four-channel optical detection on protein-patterned BioCD" Photonics West, San Jose, CA (Oral talk, 2007).

LIST COURSES TAUGHT IN LAST FIVE YEARS

Teaching Assignments Sem & Yr	Course	Title	Approx. No. of Students
F21	Phys 115	Physics for Life Sciences	152
F20	Phys 362	Intermediate Physics	20
S20	Phys 361	Classical Mechanics	34
F19	Phys 362	Intermediate Physics	22
S19	Phys 361	Classical Mechanics	34
F18	Phys 362	Intermediate Physics	20
S18	Phys 361	Classical Mechanics	31
F17	Phys 362	Intermediate Physics	19
S17	Phys 221 (Sects 23 & 24/H3)	Classical Physics II	51
F16	Phys 362	Intermediate Physics	11
F15	Phys 241 (Sects 2/H2 & 1/H1)	Classical Physics I	27

SUMMARIZE RESULTS OF STUDENT EVALUATIONS.

sem/Yr	Course	Sect	Type	Students		Instructor		Course	
				Total Enrolled	% Responded	Overall Rating	Dept Mean for like Instructors	Overall Rating	Dept Mean for like Courses
F20*	362	1	Lec	20	40			4.4	
S20	361	1	Lec	34	35	4.1	4.5	4.2	4.4
F19	362	1	Lec	22	32	3.7	4.6	4.1	4.5
S19	361	1	Lec	34	38	3.9	4.3	4.0	4.2
F18	362	1	Lec	20	40	4.9	4.3	4.9	4.2
S18	361	1	Lec	31	36	4.5	4.3	4.6	4.2
F17	362	1	Lec	19	53	4.4	4.5	4.3	4.2
S17	221	23	Rec	25	52	3.9	3.9	3.9	3.8
S17	221	24/H3	Rec	26	65	4.4	3.9	4.1	3.8
F16	362	1	Lec	11	46	3.4	4.2	3.6	4.0
F15	241	1/H1	Rec	9	33	4.3	4.1	3.7	3.8
F15	241	2/H2	Rec	18	78	4.4	4.1	4.1	3.8

* In F20, only overall rating was provided for the courses switched to online mode.

GRADUATE ADVISING

Andrea Boord

GRADUATE ADVISED

Yuanchang Zhao
Jacob Austin

POSTDOCTORAL RESEARCHER ADVISING

Gopal Niraula
Subhankar Kundu
Arghajit Pyne

POSTDOCTORAL RESEARCHER ADVISED

Kaushik Pal
Ying Tu
Yongliang Wang
Anwasha Sarkar

UNDERGRADUATE RESEARCH DIRECTED

Karla Buffini	2021-2022
Emmit Benitez	2020-2020
Nathaniel Wetter	2018-2019
Donia Alzayer	2017-2018
Haley West	2017-2018
Bailey Hoch	2016-2017
Justin Farrell	2016-2017

GRADUATE STUDENT COMMITTEE MEMBER (Non-Chairman)

Shayane Shome	2020
Shen Chen	2019
Yi Liu	2019
Omer Shafraz	2018
Kristine Manibog	2017
Tsung-Han Chou	2017

DEPARTMENTAL SERVICE

2021-Present	Strategic Planning Committee Member
2021-Present	Qualification Exam Committee Member
2016-2021	Department Colloquium Committee Member
2017-2021	Graduate Admission Committee Member
2018-2021	Student Recruitment and Undergrad Visits Committee

UNIVERSITY SERVICE

2021-Present	Biotechnology Counsel Committee Member
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