

Kai Zhang, Ph.D.

Department of Biochemistry
School of Molecular and Cellular Biology
600 South Mathews Avenue
Urbana, Illinois 61801

Office: (217) 300-0582
Fax: (217) 244-5858
Email: kaizkaiz@illinois.edu
<http://publish.illinois.edu/kaizhanglab/>

TRANSLATIONAL RESEARCH FOCUS

Expand druggable target space through intracellular antibody-guided protein degradation
Engineer optogenetic system for neural regeneration and lytic cell death
Develop optogenetic system for precise induction of lytic cell death
Translate technologies toward applications in cancer, immunotherapy, and neurobiology
Integrate quantitative imaging and synthetic biology for functional control in living systems

APPOINTMENT

Associate Professor, University of Illinois at Urbana-Champaign (UIUC)	2021-present
Assistant Professor, Department of Biochemistry, UIUC	2014-2021
Postdoctoral Scholar Stanford University	2009-2014
Ph.D. University of California, Berkeley	2002-2008

KEY INNOVATIONS & INTELLECTUAL PROPERTY

Ubiquitin-independent targeted protein degradation platform (provisional, UIUC, 2025)
Generalizable light-modulated protein stabilization system (UIUC, 2019)

SELECTED PUBLICATIONS (*CORRESPONDING AUTHOR)

Complete List of Published Work in My Bibliography:

<https://www.ncbi.nlm.nih.gov/myncbi/kai.zhang.9/bibliography/public/>

1. Qing Pei, Qixin Chen, Zhiqi Tian, Le Zhu, Yang Chen, Jihong Gong, Shen Wang, Yijuan Xiang, John S. Khamo, Jiaqi Fan, Yi Rong, Yi Yu, Yuyang Qin, Shiping Wu, Youssef Faragalla, Peng Cao, **Kai Zhang**,* Ying Lai,* Ling-Gang Wu,* Cong Ma,* Xiaofei Yang* & Jiajie Diao,* "Munc18 modulates syntaxin phase separation to promote exocytosis" **Nature Neuroscience**, 2026, 29, 306–314, doi: 10.1038/s41593-025-02140-9.
2. Tianlu Wang, **Kai Zhang**,* Yubin Zhou,* "Interrogating Physiological Functions with Light and Chemicals", **Annual Review Physiology**, 2026, 88(1):21-46. doi: 10.1146/annurev-physiol-042924-083733.
3. Tyler Camp, Zixiao Li, Yushan Li, Taek-Jung Oh, **Kai Zhang*** "Resolving Oligomeric States of Photoactivatable Proteins in Live Cells via Photon Counting Histogram Analysis", **iScience**, 2025, 28, Issue 11, 113848.
4. Kritika Mehta, Henry Yentsch, Jungbin Lee, Yeeun Yook, Kwan Young Lee, Tianyu Terry Gao, Nein-Pei Tsai, and **Kai Zhang***, "Phosphatidylinositol 3-phosphate mediates Arc capsids secretion through the multivesicular body pathway", **Proceedings of National Academy of Sciences (PNAS)**, 2024, 121 (35) e2322422121.
5. Teak-Jung Oh, Vishnu Krishnamurthy, Jeong Won Han, Junyao Zhu, Zayn Beg, Amna Mehfooz, Bryan Gworek, David J. Shapiro, **Kai Zhang*** "Spatiotemporal control of

- inflammatory lytic cell death through optogenetic induction of RIPK3 oligomerization”, **Journal of Molecular Biology**, 2024, 436, 13, 168628.
6. Kangqiang Qiu, Weiwei Zou, Hongbao Fang, Mingang Hao, Kritika Mehta, Zhiqi Tian, Jun-Lin Guan*, **Kai Zhang***, Taosheng Huang*, Jiajie Diao*, “Light-activated mitochondrial fission through optogenetic control of mitochondria-lysosome contacts,” **Nature Communications**, 2022, 13, 4303.
 7. Vishnu V. Krishnamurthy, Hyojeong Hwang, Jia Fu, Jing Yang,* **Kai Zhang***, “Optogenetic control of the canonical Wnt signaling pathway during *Xenopus laevis* embryonic development”, **Journal of Molecular Biology**, 2021, 433, Issue 18, 167050. **(Front Cover)**
 8. Qixin Chen, Hongbao Fang, Xintian Shao, Zhiqi Tian, Yuming Zhang, Huaxun Fan, **Kai Zhang***, Weijiang He*, Zijian Guo*, Jiajie Diao*, “A dual-labeling probe to track functional mitochondria–lysosome interactions in live cells”, **Nature Communications**, 2020,11, 6290.
 9. Qin Wang, Huaxun Fan, Feng Li, Savanna S. Skeeters, Vishnu Krishnamurthy, Yuanquan Song*, **Kai Zhang***, Optical control of ERK and AKT signaling promotes axon regeneration and functional recovery of PNS and CNS in *Drosophila*, **eLife**, 2020, 9, e57395.
 10. Vishnu V. Krishnamurthy, Jia Fu, Teak-Jung Oh, John Khamo, Jing Yang*, **Kai Zhang*** "A Generalizable Optogenetic Strategy to Regulate Receptor Tyrosine Kinases during Vertebrate Embryonic Development", **Journal of Molecular Biology**, 2020, 432, 10, 3149-3158.
 11. Tyler Camp, Kritika Mehta, Stephen Sligar*, **Kai Zhang***, “Molecular Orientation Determination in Nanodiscs at the Single-Molecule Level”, **Analytical Chemistry**, 2020, 92, 2, 2229-2236.
 12. Payel Mondal, Vishnu V. Krishnamurthy, Savanna R. Sharum, Neeka Haack, Huiwen Zhou, Jenifer Cheng, Jing Yang, **Kai Zhang*** “Repurposing protein degradation for optogenetic modulation of protein activities” **ACS Synthetic Biology**, 2019, 8, 11, 2585-2592 (Cover).
 13. I. Srivastava, J. S. Khamo, S. Pandit, P. Fathi, X. Huang, A. Cao, R. T. Haasch, S. Nie, **K.Zhang***, D. Pan* “Influence of Electron Acceptor and Electron Donor on the Photophysical Properties of Carbon Dots: A Comparative Investigation at the Bulk-State and Single-Particle Level. **Advanced Functional Materials** 2019, 1902466.
 14. J. S. Khamo, V. V. Krishnamurthy, Q. Chen, J. Diao, **K. Zhang***, “Optogenetic delineation of receptor tyrosine kinase subcircuits in PC12 cell differentiation”, **Cell Chemical Biology**, 2019, 26, 400-410.
 15. V. V. Krishnamurthy, J.S. Khamo, W. Mei, A. J. Turgeon, H. M. Ashraf, P. Mondal, D. B. Patel, N. Risner, E. E. Cho, J. Yang*, and K. Zhang* “Reversible optogenetic control of kinase activity during differentiation and embryonic development” **Development**, 2016, 143, 4085-4094.

SELECTED RESEARCH SUPPORT

STC-QCB seed grant Zhang (PI), Mehta (MPI) 07/01/2026-06/30/2027
Quantitative Modeling of Mitochondrial Genome Partitioning During Fission

R01 MH124827 Tsai (PI), Zhang (MPI) 12/01/2020-10/31/2026
Mechanism of Gp1 mGluR-dependent translation and plasticity

NSF 2243257	Luthey-Schulten (PI), Gruebele (Co-PI) Zhang (Co-I)	
Science and Technology Center for Quantitative Cell Biology		09/15/2023-09/14/2028
NSF 2121003	Cao (PI) Zhang (Co-PI)	10/01/2021-09/30/2023
GCR: Synthetic Neurocomputers for Cognitive Information Processing		
Cancer Center at Illinois #9572	Zhang (PI) Nelson (CoI)	07/01/2022-12/31/2024
Optogenetic Modulation of the Tumor Microenvironment to Improve Cancer Immunotherapy		
Scialog Award #27937	Zhang (PI) Levy (PI) Ross (PI)	07/01/2021-06/30/2023
Engineering enteric neuron activity to enhance antimicrobial immunity in the gut		
R01GM132438	Zhang (PI)	09/15/2019-07/31/2024
Precise regulation of native transcription factor at the single-cell level		

LEADERSHIP & PROGRAM DEVELOPMENT

Associate Department Head, Biochemistry, UIUC	2021-present
Director of Graduate Studies, Biochemistry, UIUC	2021-present
Organizer: MINFLUX imaging workgroup, UIUC	2023-present
Strategic Advisory Committee, MCB, UIUC	2022-present
Biophysics Executive Committee, UIUC	2022-present
Biophysics Entrance Advisory Committee, UIUC	2023-present
Neuroscience Program Award Committee, Chair & Executive Committee, UIUC	2023-2024
LAS General Education Committee, UIUC	2022-2023

EDITORSHIP

Journal of Molecular Biology – Associate Editor	2018-present
CRC Methods in Signal Transduction – Editor	2021
Advanced Biology – Associate Editor	2022-present

HONORS AND AWARDS

Scialog Fellow Research Award, <i>RCSA</i>	2021, 2023
Inaugural “Light Lecture” Speaker <i>University of Cincinnati</i>	2021
Scialog Fellow <i>Research Corporation for Science Advancement</i>	2020-2023
Spotlight on Early Career Researchers <i>Journal of Molecular Biology</i>	2017
Innovative Teaching and Learning Grant <i>UIUC</i>	2016
American Cancer Society Postdoctoral Fellowship <i>American Cancer Society</i>	2013
Biophysical Society Education Travel Award <i>Biophysical Society</i>	2013
American Society for Cell Biology (ASCB) Travel Award <i>ASCB</i>	2012
Irving Fatt/Samuel Ruben Award <i>UC Berkeley</i>	2004
Guo Moruo Fellowship, Top Fellowship <i>USTC</i>	2001

GRANT REVIEW PANEL

NSF Reviewer	2024, 2025
UK Research and Innovation	2024

Discovery Partners Institute	2024
Israel Science Foundation	2023
Cancer Center at Illinois (CCIL)	2023
Paul G. Allen Frontiers Group	2021, 2022
Arizona Alzheimer's Disease Core Center Grant	2017
Research Board, OVCR in UIUC	2017-2020, 2024

TEACHING & MENTORING

Instructor

University of Illinois at Urbana-Champaign

Physical Biochemistry (MCB/BIOC 446, CHEM 472)	2016-present
Neuroscience Program (NEUR598, Organizer: Justin Rhodes)	2016-present
Grading Faculty for Scientific Writing (MCB 540)	2023 Spring
Center for Physics of Living Cells, Summer Workshop	2016-present
Tutorial (BIOP 586)	2015-present

Mentoring

Postdoctoral Scholar

Dr. Vishnu Vardhan Krishnamurthy	2019 – 2020
Current position: Director, High-throughput Screening Facility	
Dr. Tyler Camp (American Parkinson Association Postdoctoral Fellow)	2021 – 2025
Current position: ISS company.	
Dr. Teak-Jung Oh (Korean American Scholarship)	2024 – 2025
Current position: Postdoctoral scholar at the University of Washington, Seattle	

Ph.D. students

Dr. John Khamo	2014-2019
Robert L. Switzer Outstanding TA (2019), Keith Westcott Fellow (2017)	
Current position: Scientist at Situ Biosciences (2021) and Neelyx lab (2022).	
Dr. Vishnu Vardhan Krishnamurthy	2014 - 2019
L. Switzer Outstanding TA (2018), Leading author of a Featured Communication and Front Cover in the Journal of Molecular Biology (2021).	
Current position: Director at UIUC HTSF	
Dr. Payel Mondal	2015 - 2020
ASBMB Travel Award (2018), Dissertation Completion Fellowship (2019), Switzer Outstanding TA (2020). Anne A. Johnson Work Award (2021, delayed from 2020).	
Current position: Postdoc at Prof. CHRISTINA TOWERS' laboratory, Salk Institute	
Dr. Savanna Sharum Skeeters	2016 - 2022
Keith Westcott Fellow (2018), second prize in the 1st School of MCB retreat (2019), Robert L. Switzer Outstanding TA (2019).	
Current position: Scientist at Cyrus Biotech	
Dr. Kritika Mehta (Kade Fellow, 2022, Robert L. Switzer Outstanding TA 2021,2022)	
Current position: Postdoctoral scholar at Weill Cornell Medicine.	
Dr. Teak-Jung Oh (Korean American Scholar Fellow 2024, LAS Travel Award 2023)	
Current position: Postdoctoral scholar at the University of Washington, Seattle	

Dr. Huaxun Fan (Kade Fellow, 2021)

Current position: Postdoctoral scholar at the University of California, Irvine

Graduate Students

Yu-En Andrew Huang (NSF GRFP Honorable Mention, Biophysics Graduate Fellow, 2022, ReproEngineering Training Grant Fellowship 2024)

Bryan Gworek (Biophysics, 2023, SRAA award BPS 2026)

Amna Mehfooz (Biochemistry, 2023, CBI Training Grant Fellowship)

Zixiao Li (Biochemistry, 2023, Danica Dabich Fellowship 2026)

Yuan Zhou (Biochemistry, 2024)

Supervisor of undergraduate students in the laboratory and onward positions

I have mentored over 40 undergraduate students, many of whom continued their career in graduate school, medical school, and industry positions.

Outreach

Instructor

Center for Physics of Living Cells (NSF funded) Summer workshop, <i>UIUC</i>	2016 - 2020
Next generation Science Technology Engineering Art Math (STEAM) demonstration (Nano Class 3-5 grade)	studio science 2017
Ecole Bilingue de Berkeley primary school Second grade, Berkeley, California	2017

Judge	MCB Undergraduate Research Symposium, <i>UIUC</i>	2021
	Undergraduate research conference	
	East Central Illinois American Chemical Society, <i>UIUC</i>	2016
	Synopsys Championship	
	<i>Santa Clara Valley Science and Engineering Fair Association</i>	2009

Co-founder	Undergraduate Student Travel Award	
	<i>University of Science and Technology of China</i>	2008 - 2011