Bo-Jui Chang (張博睿)

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Research Interests

- Light-sheet fluorescence microscopy
- Structured illumination microscopy
- Super-resolution microscopy
- Optical Tweezers
- Live imaging of single cells, Drosophila embryos, zebrafish embryos, spheroids, and organoids.

Current position

I am currently a Research Assistant Professor in the Lyda Hill Department of Bioinformatics, UT Southwestern Medical Center. My research focuses on live-imaging with light-sheet fluorescence microscopy (LSFM) and super-resolution structured illumination microscopy (SIM). I collaborate closely with biologists to study the behavior of cells, tissues, embryos, etc., in physiologically relevant environments. My work is mainly carried out within the Danuser, Dean, and Fiolka labs. Specifically, my duties are:

- Use cutting-edge light-sheet microscopes to perform 3D live imaging of single cancer cells or in the context of small organelles and spheroids.
- Use zebrafish as an animal model to study cancer cell biological processes.
- Establish imaging collaborations across campus that will lead to new biological insights.
- Combine super-resolution microscopy, particularly structured illumination microscopy, single molecule localization microscopy, and expansion microscopy with light-sheet microscopy.

Experience

2022 Sep. - present	Research Assistant Professor, *Lyda Hill Department of Bioinformatics, UT Southwestern Medical Center, Dallas, U.S.A.* UTSouthwestern Medical Center
2019 Nov. – 2022 Aug	Senior research scientist, *Department of Cell Biology, UT Southwestern Medical Center, Dallas, U.S.A.* Dr. Reto Fiolka group UTSouthwestern Medical Center

2017 Sep. – 2019 Nov.	Assistant instructor, *Department of Cell Biology, UT Southwestern Medical Center, Dallas, U.S.A.* Dr. Reto Fiolka group
2016 - 2017	Postdoctor, *Research Center for Applied Sciences, Academia Sinica, Taiwan* Dr. Bi-Chang Chen group
2011 - 2016	Postdoctor, *Buchmann Institute for Molecular Life Sciences, Goethe University Frankfurt am Main, Germany* Prof. Dr. Ernst H.K. Stelzer group
2013 - 2015	Adjunct investigator, *Cluster of excellent Frankfurt Macromolecular Complexes, Germany* Prof. Dr. Ernst H.K. Stelzer group
2007 - 2011	Postdoctor, *National Synchrotron Radiation Research Center, Taiwan* Dr. Su-Yu Chiang group

Fellowship

2013 March - June	EMBO Short-term fellowship, *European Molecular Biology Organization, Germany* Prof. Dr. Ernst H.K. Stelzer group
2011 - 2012	Postdoctoral Research Abroad Program, *National Science Council, Taiwan* Prof. Dr. Ernst H.K. Stelzer group

Education

2001 - 2006	Ph.D., *Institute of Electro-Optical Engineering, National Chiao-Tung University, Taiwan* Advisor: Prof. Long Hsu and Prof. Sien Chi Thesis: Design and study of an optical tweezers system for measuring adhesion and extension properties of biological materials
1999 - 2001	M.S., *Department of Electrophysics, National Chiao-Tung University, Taiwan* Advisor: Prof. Long Hsu Thesis: Design and Application of In-focus and Off-focus Optical Tweezers

1995 - 1999	B.S., *Department of Electrophysics, National Chiao-Tung University, Taiwan*

Computer Skills

LabVIEW, MATLAB, Mathematica, Fiji(ImageJ), and Autodesk Inventor

Language

English: Proficient

Chinese: Native speaker

Seminars (invited speaker)

2024 March 3rd	APS 2024 March Meeting 2024, Minneapolis & Virtual, USA Session T10s: T10: Super-resolution Imaging Methods and Analysis in Biological Physics (https://meetings.aps.org/Meeting/MAR24/Session/T10s.1)
2023 Nov 15th	MiFoBio 2023 (https://imabio-cnrs.fr/mifobio/programme-2023/), France, "Light-sheet fluorescence microscopy: theory, applications, and new techniques", (https://youtu.be/I0eetEix3Fg?si=Pz5oXqiE2pF6xMz8)
2019 April 18th	Cancer Research UK Cambridge institute, United Kingdom, "Light sheet fluorescence microscopy: imaging from single cells to live organisms" (http://www.lightmicroscopy.cruk.cam.ac.uk/next-generation-microscopy-workshop/)
2017 April 10th	Brain Research Center, National Tsing Hua University, Taiwan (R.O.C.), "Advanced microscopic techniques other than STED and Localization microscopy: SR-SIM, LSFM, LLSM, csiLSFM"
2014 April 22nd	Graduate Institute of Electro-Optical Engineering, Chang Gung University, Taiwan (R.O.C.), "Development and Application of Coherent Structured Illumination-Light Sheet Fluorescence Microscope (csiLSFM)"
2014 April 21st	Institute of Biophotonics, National Yang-Ming University, Taiwan (R.O.C.) "Development and Application of Coherent Structured Illumination-Light Sheet Fluorescence Microscope (csiLSFM)"
2014 April 10th - 11th	Lightsheet Fluorescence Microscopy Workshop, Institute for Medical Biology (IMB), Biopolis, Singapore (http://www.imcb.a-star.edu.sg/bseminars/20140410a.pdf)

2011 April 12th	Department of Photonics, Feng Chia University, Taiwan (R.O.C.), "Super resolution structured illumination fluorescence microscopy" (http://www.photonics.fcu.edu.tw/wSite/ct?xItem=109767&ctNode=20988&mp=505101)
2009 September 24th	Department of Electrophysics, National Chiao Tung University, Taiwan (R.O.C.), "High spatial resolution image in structured illumination microscopy patterned with a spatial light modulator" (http://www.ep.nctu.edu.tw/app/news.php?Sn=376)

Publications

Preprint

1. S. Gałecki, B.-J. Chang, F. Zhou, Q. Shen, D. Stoddard, B. Chen, D. Nicastro, R. Fiolka, and K. M. Dean, "Unraveling Subcellular Ultrastructure with Cyclically Multiplexed Expansion Microscopy," bioRxiv 2026.01.01.697161 (2026).
2. B. Chen, A. Millett-Sikking, S. Gałecki, S. Daetwyler, J. Jiou, J. Monistrol, Q. Shen, F. Zhou, H.-Y. Lin, E. Jenkins, M. C. Stein, M. Marlar-Pavey, G. Sturm, A. L. Li, Q. Tang, B. Feng, U. Diaz, Y. Chen, A. Shalizi, A. Gillich, J. R. Friedman, R. Tomer, B.-J. Chang, W. F. Marshall, S. Shahmoradian, K. M. Dean, and R. Fiolka, "Multi-immersion Oblique Plane Microscope (miOPM): A reconfigurable platform for high-resolution Light-Sheet Fluorescence Microscopy," bioRxiv 2025.10.04.680473 (2025). (in revision)
3. D. Segal, X. Wang, H. Mazloom-Farisbaf, D. Rajendran, E. Butler, B. Chen, B.-J. Chang, K. Ahuja, A. Perny, K. Bhatt, D. K. Reed, D. H. Castrillon, J. Lee, E. Jeffery, L. Wang, K. Nguyen, N. S. Williams, S. X. Skapek, S. Rajaram, R. Fiolka, K. Jaqaman, G. Hon, J. F. Amatruda, and G. Danuser, "Caveolin-1 regulates context-dependent signaling and survival in Ewing sarcoma," bioRxiv 2024.09.23.614468 (2025)., https://doi.org/10.1101/2024.09.23.614468

Journal papers

1. J. Noh, W. M. Wong, B.-J. Chang, G. Danuser, and J. P. Meeks, "Combinatorial responsiveness of chemosensory neurons in mouse explants revealed by DynamicNeuroTracker," Cell Reports Methods 5(11), 101216 (2025).
2. F. Y. Zhou, Z. Marin, C. Yapp, Q. Zou, B. A. Nanes, S. Daetwyler, A. R. Jamieson, M. T. Islam, E. Jenkins, G. M. Gihana, J. Lin, H. M. Borges, B.-J. Chang, A. Weems, S. J. Morrison, P. K. Sorger, R. Fiolka, K. M. Dean, and G. Danuser, "Universal consensus 3D segmentation of cells from 2D segmented stacks," Nature Methods 22(11), 2386–2399 (2025).
3. T. Isogai, K. M. Dean, P. Roudot, E. V Azarova, K. Bhatt, M. K. Driscoll, S. P. Royer, N. Mittal, B.-J. Chang, S. J. Han, R. Fiolka, and G. Danuser, "Direct Arp2/3-vinculin binding is required for pseudopod extension, but only on compliant substrates and in 3D," iScience 28(6), (2025).
4. A. Kohli, A. N. Angelopoulos, D. McAllister, E. Whang, S. You, K. Yanny, F. M. Gasparoli, B.-J. Chang, R. Fiolka, and L. Waller, "Ring deconvolution microscopy: exploiting symmetry for efficient spatially varying aberration correction," Nat. Methods (2025)., https://doi.org/10.1038/s41592-025-02684-5
5. B. Chen, B.-J. Chang, S. Daetwyler, F. Zhou, S. Sharma, D. M. Lee, A. Nayak, J. Noh, K. Dubrovinski, E. H. Chen, M. Glotzer, and R. Fiolka, "Projective light-sheet microscopy with flexible parameter selection," Nat Commun 15(1), 2755 (2024).
6. B.-J. Chang, D. Shepherd, and R. Fiolka, "Projective oblique plane structured illumination microscopy," npj Imaging 1, 2 (2023).

7. R. Fiolka, S. Daetwyler, B.-J. Chang, B. Chen, F. F. Voigt, D. Rajendran, and F. Zhou, "Mesoscopic oblique plane microscopy via light-sheet mirroring," Optica 10(11), 1571–1581 (2023).

8. A. D. Weems, E. S. Welf, M. K. Driscoll, F. Y. Zhou, H. Mazloom-Farsibaf, B. J. Chang, V. S. Murali, G. M. Gihana, B. G. Weiss, J. Chi, D. Rajendran, K. M. Dean, R. Fiolka, and G. Danuser, "Blebs promote cell survival by assembling oncogenic signalling hubs," Nat. 2023 1 – 9 (2023). https://doi.org/10.1038/s41586-023-05758-6

9. B. Chen, B.-J. Chang, P. Roudot, F. Zhou, E. Sapoznik, M. Marlar-Pavey, J. B. Hayes, P. T. Brown, C.-W. Zeng, T. Lambert, J. R. Friedman, C.-L. Zhang, D. T. Burnette, D. P. Shepherd, K. M. Dean, and R. P. Fiolka, "Resolution doubling in light-sheet microscopy via oblique plane structured illumination," Nat. Methods 2022 1–8 (2022)., https://doi.org/10.1038/s41592-022-01635-8

10. B. Chen, B.-J. Chang, F. Y. Zhou, S. Daetwyler, E. Sapoznik, B. A. Nanes, B. A. Nanes, I. Terrazas, I. Terrazas, I. Terrazas, G. M. Gihana, L. P. Castro, I. S. Chan, I. S. Chan, I. S. Chan, M. Conacci-Sorrell, M. Conacci-Sorrell, M. Conacci-Sorrell, K. M. Dean, A. Millett-Sikking, A. G. York, and R. Fiolka, "Increasing the field-of-view in oblique plane microscopy via optical tiling," Biomed Opt Express 13(11), 5616–5627 (2022).

11. D. Segal, H. Mazloom-Farsibaf, B.-J. Chang, P. Roudot, D. Rajendran, S. Daetwyler, R. Fiolka, M. Warren, J. F. Amatruda, and G. Danuser, "In vivo 3D profiling of site-specific human cancer cell morphotypes in zebrafish," J. Cell Biol. 221(11), (2022)., https://doi.org/10.1083/jcb.202109100

12. E. H. K. Stelzer, F. Strobl, B.-J. Chang, F. Preusser, S. Preibisch, K. McDole, and R. Fiolka, "Light sheet fluorescence microscopy," Nat. Rev. Methods Prim. 2021 11 1(1), 1–25 (2021)., https://doi.org/10.1038/s43586-021-00069-4

13. B.-J. Chang, J. D. Manton, E. Sapoznik, T. Pohlkamp, T. S. Terrones, E. S. Welf, V. S. Murali, P. Roudot, K. Hake, L. Whitehead, A. G. York, K. M. Dean, and R. Fiolka, "Real-time multi-angle projection imaging of biological dynamics," Nat. Methods 1–6 (2021)., https://doi.org/10.1038/s41592-021-01175-7

14. E. Sapoznik, B.-J. Chang, J. Huh, R. J. Ju, E. VAzarova, T. Pohlkamp, E. S. Welf, D. Broadbent, A. F. Carisey, S. J. Stehbens, K.-M. Lee, A. Marín, A. B. Hanker, J. C. Schmidt, C. L. Arteaga, B. Yang, Y. Kobayashi, P. R. Tata, R. Kruithoff, K. Doubrovinski, D. P. Shepherd, A. Millett-Sikking, A. G. York, K. M. Dean, and R. P. Fiolka, "A versatile oblique plane microscope for large-scale and high-resolution imaging of subcellular dynamics," Elife 9:e57681, (2020)., https://doi.org/10.7554/eLife.57681

15. T.Chakraborty, B.Chen, S.Daetwyler, B.-J.Chang, O.Vanderpoorten, E.Sapoznik, C. F.Kaminski, T. P. J.Knowles, K. M.Dean, and R.Fiolka, "Converting lateral scanning into axial focusing to speed up three-dimensional microscopy," Light Sci. Appl. 9(1), 165 (2020)., https://doi.org/10.1038/s41377-020-00401-9

16. B.-J.Chang, K.Dean, and R.Fiolka, "A systematic and quantitative comparison of lattice and Gaussian light-sheets," Opt. Express 28(18), 27052 (2020)., https://doi.org/10.1364/OE.400164

17. B.-J.Chang, W.-C.Tang, Y.-T.Liu, Y.-C.Tsai, C.Tsao, P.Chen, and B.-C.Chen, "Two-beam interference lattice lightsheet for structured illumination microscopy," J. Phys. D. Appl. Phys. 53(4), 044005 (2020). DOI:10.1088/1361-6463/ab50e2

18. Bo-Jui Chang, and Reto Fiolka: *Light-sheet engineering using the Field Synthesis theorem*. J. Phys. Photonics 2(1), 014001 (2019)., DOI:10.1088/2515-7647/ab5028

19. Tonmoy Chakraborty, Meghan K. Driscoll, Elise Jeffery, Malea M. Murphy, Philippe Roudot, Bo-Jui Chang, Saumya Vora, Wen Mai Wong, Cara D. Nielson, Hua Zhang, Vladimir Zhemkov, Chitkale

Hiremath, Estanislao Daniel De La Cruz, Yi Yating, Ilya Bezprozvanny, Hu Zhao, Raju Tomer, Rainer Heintzmann, Julian P. Meeks, Denise K. Marciano, Sean J. Morrison, Gaudenz Danuser, Kevin M. Dean, and Reto Fiolka: *Light-sheet microscopy of cleared tissues with isotropic, subcellular resolution*. Nature Methods 11/2019; 16(11):1109-1113., DOI:10.1038/s41592-019-0615-4

20. Vasanth S. Murali, Bo-Jui Chang, Reto Fiolka, Gaudenz Danuser, Murat Can Cobanoglu, Erik S. Welf: *An image-based assay to quantify changes in proliferation and viability upon drug treatment in 3D microenvironments*. BMC Cancer 12/2019; 19(1)., DOI:10.1186/s12885-019-5694-1
21. Bo-Jui Chang, Mark Kittisopikul, Kevin M. Dean, Philippe Roudot, Erik S. Welf, Reto Fiolka: *Universal light-sheet generation with field synthesis*. Nature Methods 02/2019; 16(3)., DOI:10.1038/s41592-019-0327-9
22. Chih-Wei Chen, Po-Hsun Wang, Li-Jun Chou, Yin-Yu Lee, Bo-Jui Chang, Su-Yu Chiang: *High-resolution light-scattering imaging with two-dimensional hexagonal illumination patterns: System implementation and image reconstruction formulations*. Optics Express 09/2017; 25(18):21652., DOI:10.1364/OE.25.021652
23. Bo-Jui Chang, Victor Didier Perez Meza, Ernst H. K. Stelzer: *csiLSFM combines light-sheet fluorescence microscopy and coherent Structured illumination for a lateral resolution below 100 nm*. Proceedings of the National Academy of Sciences 04/2017; 114(19):201609278., DOI:10.1073/pnas.1609278114
24. Victor Perez, Bo-Jui Chang, Ernst Hans Karl Stelzer: *Optimal 2D-SIM reconstruction by two filtering steps with Richardson-Lucy deconvolution*. Scientific Reports 11/2016; 6:37149., DOI:10.1038/srep37149
25. Francesco Pampaloni, Bo-Jui Chang, Ernst H K Stelzer: *Erratum to: Light sheet-based fluorescence microscopy (LSFM) for the quantitative imaging of cells and tissues*. Cell and Tissue Research 03/2015; 360(1)., DOI:10.1007/s00441-015-2144-5
26. Hsiao-Chih Huang, Bo-Jui Chang, Li-Jun Chou, Su-Yu Chiang: *Three-beam interference with circular polarization for structured illumination microscopy*. Optics Express 10/2013; 21(20):23963-23977., DOI:10.1364/OE.21.023963
27. Mao-Feng Weng, Bo-Jui Chang, Su-Yu Chiang, Niann-Shiah Wang, Huan Niu: *Cellular uptake and phototoxicity of surface-modified fluorescent nanodiamonds*. Diamond and Related Materials 02/2012; 22:96–104., DOI:10.1016/j.diamond.2011.12.035
28. Bo-Jui Chang, Shiuan Huei Lin, Li-Jun Chou, Su-Yu Chiang: *Subdiffraction scattered light imaging of gold nanoparticles using structured illumination*. Optics Letters 12/2011; 36(24):4773-5., DOI:10.1364/OL.36.004773
29. Bo-Jui Chang, Li-Jun Chou, Yun-Ching Chang, Su-Yu Chiang: *Isotropic image in structured illumination microscopy patterned with a spatial light modulator*. Optics Express 09/2009; 17(17):14710-21., DOI:10.1364/OE.17.014710
30. Bo-Jui Chang, Ying-Jung Huang, Chia-Han Chan, Long Hsu, Hwei-Ling Peng, Hwan-You Chang, Tri-Rung Yew, Cheng-Hsien Liu, Sien Chi: *Measurement of the adhesive force between a single Klebsiella pneumoniae type 3 fimbria and collagen IV using optical tweezers*. Biochemical and Biophysical Research Communications 12/2006; 350(1):33-8., DOI:10.1016/j.bbrc.2006.08.190
31. Chia-Fen Hsieh, Bo-Jui Chang, Chyi-Huey Pai, Hsuan-Yi Chen, Jin-Wu Tsai, Yung-Hsiang Yi, Yi-Ting Chiang, Da-Wei Wang, Sien Chi, Long Hsu, Chi-Hung Lin: *Stepped Changes of Monovalent Ligand-*

binding Force during Ligand-induced Clustering of Integrin αIIBβ3. Journal of Biological Chemistry 09/2006; 281(35):25466-25474

32. Bo-Jui Chang, Sien Chi, Long Hsu: *Rapid and simple automatic trapping-force calibration system for optical tweezers*. Optical Engineering 11/2005; 44(11)., DOI:10.1117/1.2128632

Presentations at conferences

1. B.-J. Chang, T. Isogai, R. Fiolka, "Hexagonal lattice light-sheets and Gaussian dark-sheets to improve the axial resolution in LSFM", Focus on Microscopy, MO-AF2-PAR-D (2025).
2. C. Fadden, B. Chen, B.-J. Chang, R. Fiolka, "Adaptive optics for oblique plane microcopy", TU-AF2-PAR-C (2025).
3. B.-J. Chang, B. Chen, and R. Fiolka, "Pushing the Limits with Structured Illumination in Light-Sheet Fluorescence Microscopy", Biophotonics Congress: Optics in the Life Sciences (2023). https://www.optica.org/events/congress/biophotonics_congress/
4. B.-J. Chang, K.M. Dean, R. Fiolka, "Physical Properties of Square and Hexagonal Lattice Light-Sheets", Focus on Microscopy, MO-PAR2-D (2021).
5. B.-J. Chang, R. Fiolka, M. Kittisopikul, K.M. Dean, P. Roudot, E. Welf, "Positive and Negative Light-Sheets - an Attractive Combination", Focus on Microscopy, MO-AF1-PAR-D (2019).
6. T. Chakraborty, B.-J. Chang, K.M. Dean, R. Fiolka, "Multi-Immersion Axially Swept Light-Sheet Microscopy for Large-Scale Tissue Imaging with Isotropic Sub-Micron Resolution", Focus on Microscopy, MO-AF2-PAR-D (2019).
7. B.-J. Chang, M. Kittisopikul, K.M. Dean, P. Roudot, E. Welf, R. Fiolka, "Lattice Light-Sheet Microscopy without Optical Lattices", Focus on Microscopy, P2-B-2/5 (2019).
8. R. Fiolka, K.M. Dean, B.J. Chang, "Rapid Subcellular Imaging with Light-Sheet Fluorescence Microscopy", Focus on Microscopy, SU-AF-FLASH (2018).
9. R. Fiolka, B.-J. Chang, "Optical Properties of Lattice Light-Sheet Illumination", Focus on Microscopy, SU-AF-PAR-A (2018).
10. B.-J. Chang, V. D. Perez-Meza, and E.H.K. Stelzer, "Structured illumination microscopy with counter-propagating light sheet illumination: csilsfm", Focus on Microscopy, WE-MO1-PAR-C (2016).
11. V. D. Perez-Meza, B.-J. Chang, and E.H.K. Stelzer, "Optimizing 2D-SIM image reconstruction by artifact minimization", Focus on Microscopy, WE-MO2-PAR-B (2016).
12. B.-J. Chang, V. D. Perez-Meza, and E.H.K. Stelzer, "Coherent Structured Illumination Provides a Lateral Resolution of λ/4n in LSFM (csiLSFM)", 2nd Lightsheet fluorescence Microscopy international conference, http://www.lsfm2015.org/index.php/program/ (2015).
13. B.-J. Chang, V.D. Perez-Meza, and E.H.K. Stelzer, "Coherent structured illumination provides a lateral resolution of λ/4n in light sheet-based fluorescence microscopy", Focus on Microscopy, TU-MO-PAR-D (2015).
14. V.D. Perez-Meza, B.-J. Chang, and E.H.K. Stelzer, "Automated optimization for 2D-SIM image reconstruction", Focus on Microscopy, P2-B/10 (2015).
15. A. Jost, E. Tolstik, B.-J. Chang, E.H.K. Stelzer, A. Sentenac, and R. Heintzmann, "Blind structured illumination microscopy reconstruction in thick samples", Focus on Microscopy, P2-B/03 (2015).

16. B.-J. Chang, V. D. Perez-Meza, and E.H.K. Stelzer, “Coherent structured illumination adds super resolution to light sheet-based fluorescence microscopy”, 1st Lightsheet fluorescence Microscopy international conference, p. 46 (2014).
17. B.-J. Chang, and E.H.K. Stelzer, “Coherent structured illumination adds super resolution to light sheet-based fluorescence microscopy”, Focus on Microscopy, MO-MO-PAR-A (2014).
18. D. von Wangenheim, A. Schmitz, B.-J. Chang, A. Maizel, and E.H.K. Stelzer, “Imaging lateral root organogenesis deep inside the main root with light sheet-based fluorescence microscopy (LSFM)”, Focus on Microscopy, WE-MO2-PAR-E (2014).
19. S.-Y. Chiang, H.-C. Huang, B.-J. Chang, and L.-J. Chou, “Three-beam interference with circular polarization for structured illumination microscopy”, Focus on Microscopy, P1-C/09 (2014).
20. S.-Y. Chiang, B.-J. Chang, S.-H. Lin, and L.-J. Chou, “Subdiffraction scattered light imaging of gold nanoparticles using structured illumination”, Focus on Microscopy, MO-AF1-PAR-A (2012).
21. S.-Y. Chiang and B.-J. Chang, “Scattered light imaging beyond the diffraction limit with structured illumination”, Focus on Microscopy, P1-B (2011).
22. B.-J. Chang, L.-J. Chou, and S.-Y. Chiang, “Three-dimensional structured illumination microscopy: double lateral resolution of wide-field fluorescence microscopy with optical sectioning ability”, The 15th Joint Biophysics Conference, P7-005 (2010), Taiwan.
23. B.-J. Chang, L.-J. Chou, and S.-Y. Chiang, “Resolution improvements in three-dimensional structured illumination microscopy”, Focus on Microscopy, MO-MO-PAR-A (2010).
24. B.-J. Chang, L.-J. Chou, and S.-Y. Chiang, “High resolution image in fluorescence microscopy via structured illumination patterned with a spatial light modulator”, PSROC2010, E3-3, Annual Meeting of the Physical Society of ROC in Taiwan (2010), Taiwan.
25. B.-J. Chang, L.-J. Chou, and S.-Y. Chiang, “Three-dimensional high resolution image in structured illumination microscopy patterned with a spatial light modulator”, OPT2009, FO135, Optics and Photonics Taiwan’09 (2009), Taiwan.
26. B.-J. Chang, L.-J. Chou, and S.-Y. Chiang, “High-resolution image in three-dimensional structured illumination microscopy patterned with a spatial light modulator”, The 14th Joint Biophysics Conference, P4-007 (2009), Taiwan. (First prize of poster competition of group C).
27. L.-J. Chou, B.-J. Chang, and S.-Y. Chiang, “Laterally isotropic image in structured illumination microscopy patterned with a spatial light modulator”, The 14th Joint Biophysics Conference, P4-006 (2009), Taiwan.
28. B.-J. Chang, L.-J. Chou, Y.-C. Chang, and S.-Y. Chiang, “Application of spatial light modulator in structured illumination microscopy”, LALS2008, Sat-P2-007 (2008).
29. B.-J. Chang, C.-K. Huang, and S.-Y. Chiang, “Two-photon fluorescence correlation spectroscopy and its application in the interactions of biomolecules”, Focus on Microscopy, PF2 (2008).
30. C.-K. Huang, B.-J. Chang, M.-F. Weng, Y.-C. Chen, and S.-Y. Chiang, “The Application of Two-Photon Fluorescence Correlation Spectroscopy for Single Molecular Detection”, 2nd Asia-Oceania Forum for Synchrotron Radiation Research, 220 (2007).
31. C.-H. Chan, B.-J. Chang, Y.-J. Huang, C.-C. Fan, H.-L. Peng, S. Chi, and L. Hsu, “Analysis of the swimming activity of Pseudomonas aeruginosa by using photonic force microscope”, Proc. SPIE 5930, 59300E-1-59300E-8 (2005).

32. C.-F. Hsieh, B.-J. Chang, L. Hsu, S. Chi, and C.-H. Lin, "Identification of stepped changes of binding affinity during interactions between the disintegrin rhodostomin and integrin αIIbβ3 in living cells using optical tweezers", Proc. SPIE 5514, 215-224 (2004).
33. C.-L. Tsai, B.-J. Chang, and L. Hsu, "Influence of the Condenser on Sample tracking of Small Beads via Forward Scattering Pattern Detection", Proc. SPIE 5514, 393-401 (2004).
34. B.-J. Chang, C.-F. Hsieh, C.-H. Lin, S. Chi, and L. Hsu, "Observing the dynamic variation of the binding force between rhodostomin ligand and integrin αIIbβ3 receptor using photonic force microscope", Proc. SPIE 5514, 552-559 (2004).
35. B.-J. Chang, C.-F. Hsieh, C.-H. Lin, S. Chi, and L. Hsu, "Photonic Force Microscope: An Optical Tweezers based Microscopy Technique", OPT2003 Proceedings ⅢPF1-9, 367-369, Optics and Photonics Taiwan' 03, Taipei, Taiwan (2003).
36. C.-L. Tsai, B.-J. Chang, and L. Hsu, "Position Dependence of the Condenser on Tracking of Small Beads via Forward Scattering Pattern Detection", OPT2003 Proceedings ⅢPF2-3, 376-378, Optics and Photonics Taiwan' 03, Taipei, Taiwan (2003).
37. B.-J. Chang, L. Hsu, and S. Chi, "An off-focus Optical Tweezers: A New Tool for Capturing and Manipulating a Group of Particles", SCI Proceedings of Signals Processing and Optical Systems, Technologies and Application X, 296-299 (2003).
38. T.-M. Hsieh, B.-J. Chang, and L. Hsu. "Automation of optical tweezers", Proc. SPIE 4082, 232-240 (2000).

Patents

1. B. Chen, B,-J, Chang, R. Fiolka, "Optical rotator systems and methods", US Patent App. 18/697,643, US20250231397A1, https://patents.google.com/patent/US20250231397A1/en.
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Contribution to Science

1. Optical tweezers. My first focus in the microscopy field was on optical tweezers (OT). I built an optical tweezer system in my third year of undergraduate. We collaborated with several biological groups in Taiwan: the group of Prof. Hwan-You Chang in Department of Life Science at National Tsing Hua University (a), the group of Prof. Hwei-Ling Peng in Department of Biological Science and Technology at National Chiao Tung University (a), and the group of Prof. Chi-Hung Lin in the Institute of Microbiology and Immunology at National Yang-Ming University (b). Specifically, we used OT to measure the adhesive force between a single Klebsiella pneumoniae type 3 fimbria and collagen IV (a), and between snake venom rhodostomin and Integrin αIIBβ3 (b), respectively. While collaborating with Dr. Lin, I also built an optical tweezers system in his lab. His lab was ~80km from our lab, which needed ~2 hours each way. I had to travel to his lab with public transportation on my own several days per week. But it was a nice experience to see how a wet lab works and how technology helps in biological research. That was also the time when the confocal microscope started to be commercialized and when PCR was invented. That's also when I was motivated by the concept that advanced imaging techniques should be developed in immediate proximity to biology.

a. Chang BJ, Huang YJ, Chan CH, Hsu L, Peng HL, Chang HY, Yew TR, Liu CH, Chi S. Measurement of the adhesive force between a single Klebsiella pneumoniae type 3 fimbria and collagen IV using optical tweezers. Biochem Biophys Res Commun. 2006 Nov 10;350(1):33-8. PubMed PMID: 16997275.

b. Hsieh CF, Chang BJ, Pai CH, Chen HY, Tsai JW, Yi YH, Chiang YT, Wang DW, Chi S, Hsu L, Lin CH. Stepped changes of monovalent ligand-binding force during ligand-induced clustering of integrin alphaIIB beta3. J Biol Chem. 2006 Sep 1;281(35):25466-74. PubMed PMID: 16793773.

2. Super-resolution structured illumination microscopy. I started to work on structured illumination microscopy (SIM) during my first postdoctoral training in Dr. Chiang’s lab. This was the first structured illumination microscope at that time nationwide, and probably still the only one in Taiwan. I started the assembly from scratch and learned the whole concept of SIM by myself by reading the relevant literature. All the software and hardware to control the microscope, as well as the reconstruction of SIM images were conducted by me. We also implemented a spatial light modulator (SLM) to replace the mechanical movement of the grating, which removes the challenge of precise mechanical control of the grating and increases the acquisition speed (a). We also investigated the possibility of applying SIM in scattering media (b). After I left the lab, Dr. Chiang still discussed her SIM project with me from time to time, and in the end, we published a few more papers about SIM (c). Later, my colleague in Germany and I also improved the SIM reconstruction algorithm (d).

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b. Chang BJ, Lin SH, Chou LJ, Chiang SY. Subdiffraction scattered light imaging of gold nanoparticles using structured illumination. Opt Lett. 2011 Dec 15;36(24):4773-5. PubMed PMID: 22179879.

c. Huang HC, Chang BJ, Chou LJ, Chiang SY. Three-beam interference with circular polarization for structured illumination microscopy. Opt Express. 2013 Oct 7;21(20):23963-77. PubMed PMID: 24104307.

d. Perez V, Chang BJ, Stelzer EH. Optimal 2D-SIM reconstruction by two filtering steps with Richardson-Lucy deconvolution. Sci Rep. 2016 Nov 16;6:37149. PubMed Central PMCID: PMC5111067.

3. Light-sheet fluorescence microscopy. I began working on light-sheet fluorescence microscopy in 2011 as a postdoctoral researcher in Dr. Stelzer's laboratory, where I had the unique opportunity to learn directly from the inventor of the technique. This formative experience provided not only a deep technical foundation but also firsthand insight into how biologists apply LSFM to address fundamental questions, which motivated me to co-author two review articles on the subject (a,b). Subsequently, in Dr. Fiolka's lab, I expanded my work in LSFM by introducing a Fourier theorem framework that enabled us to design a flexible system capable of generating nearly any type of light-sheet—including Bessel and lattice beams—while minimizing optical complexity and laser power losses (c). This approach also allowed us to engineer novel light-sheet modalities with the potential to enhance axial resolution. Additionally, we also developed an open-top light-sheet microscope called oblique plane microscope, which is user-friendly, stable, and with good environment control, thereby broadening the accessibility and applications of LSFM (d).

a. Stelzer E, Strobl F, Chang B, Preusser F, Preibisch S, McDole K, Fiolka R. Light sheet fluorescence microscopy. Nature Reviews Methods Primers. 2021 November 03; 1(1):73. Available from: https://doi.org/10.1038/s43586-021-00069-4 DOI: 10.1038/s43586-021-00069-4

b. Pampaloni F, Chang BJ, Stelzer EH. Erratum to: light sheet-based fluorescence microscopy (LSFM) for the quantitative imaging of cells and tissues. Cell Tissue Res. 2015 Oct;362(1):265. PubMed PMID: 26169303.

c. Chang BJ, Kittisopikul M, Dean KM, Roudot P, Welf ES, Fiolka R. Universal light-sheet generation with field synthesis. Nat Methods. 2019 Mar;16(3):235-238. PubMed Central PMCID: PMC6561754.

d. Sapoznik E, Chang BJ, Huh J, Ju RJ, Azarova EV, Pohlkamp T, Welf ES, Broadbent D, Carisey AF, Stehbens SJ, Lee KM, Marín A, Hanker AB, Schmidt JC, Arteaga CL, Yang B, Kobayashi Y, Tata PR, Kruithoff R, Doubrovinski K, Shepherd DP, Millett-Sikking A, York AG, Dean KM, Fiolka RP. A versatile oblique plane microscope for large-scale and high-resolution imaging of subcellular dynamics. Elife. 2020 Nov 12;9 PubMed Central PMCID: PMC7707824.

4. Combining SIM and LSFM. Given my expertise in both structured illumination microscopy (SIM) and light-sheet fluorescence microscopy (LSFM), I have long been interested in integrating these complementary approaches. While in Dr. Stelzer's lab, I successfully combined SIM with LSFM and achieved sub-100 nm lateral resolution, which still holds the record in far field linear SIM combined with LSFM (a). Later, in Dr. Bi-Chang Chen's lab, I investigated the SIM mode in lattice light-sheet microscope (LLSM) and published work related to 2D-SIM mode in LLSM (b). More recently, in collaboration with Dr. Reto Fiolka, who is also an expert in both SIM and LSFM, we successfully integrating SIM with oblique plane microscope (c), an open-top light-sheet microscope that provides user-friendly operation and broad accessibility as mentioned above. Together, these developments demonstrate my sustained contributions to advancing different imaging platforms that push the resolution and application boundaries of LSFM.

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b. Chang B, Tang W, Liu Y, Tsai Y, Tsao C, Chen P, Chen B. Two-beam interference lattice lightsheet for structured illumination microscopy. Journal of Physics D: Applied Physics. 2019 November 18;

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c. Chen B, Chang BJ, Roudot P, Zhou F, Sapoznik E, Marlar-Pavey M, Hayes JB, Brown PT, Zeng CW, Lambert T, Friedman JR, Zhang CL, Burnette DT, Shepherd DP, Dean KM, Fiolka RP. Resolution doubling in light-sheet microscopy via oblique plane structured illumination. Nat Methods. 2022 Nov;19(11):1419-1426. PubMed Central PMCID: PMC10182454.

5. LSFM in Biological applications. In addition to advancing light-sheet microscopy technology, I have also applied light-sheet fluorescence microscopy (LSFM) to address fundamental biological questions. Notably we successfully imaged the morphology and dynamic behavior of Ewing's sarcoma cells within live zebrafish at high resolution (a). We captured the dynamic formation of membrane blebs and revealed their role as oncogenic signaling hubs that promote cancer cell survival using our custom-built LSFM systems (b). I also contributed to the development and application of LSFM for imaging optically cleared tissues, which achieve isotropic and subcellular resolution. LSFM has proven especially valuable for imaging cleared tissue and expansion samples (c). Briefly, these studies demonstrate how LSFM enables unique insights into cellular architecture and dynamics in living and complex systems, and they underscore my contributions to applying LSFM for important biological discoveries.

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b. Weems AD, Welf ES, Driscoll MK, Zhou FY, Mazloom-Farsibaf H, Chang BJ, Murali VS, Gihana GM, Weiss BG, Chi J, Rajendran D, Dean KM, Fiolka R, Danuser G. Blebs promote cell survival by assembling oncogenic signalling hubs. Nature. 2023 Mar;615(7952):517-525. PubMed Central ID: PMC10881276.

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