Hao F. Zhang

Curriculum Vitae

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EMPLOYMENT

2017−present	Professor, Department of Biomedical Engineering and Department of Ophthalmology (by courtesy), Northwestern University, Evanston, IL
2015−present	Co-founder, Opticent Inc. (DBA Opticent Health), Evanston, IL
2013−2016	Associate Professor, Department of Biomedical Engineering and Department of Ophthalmology (by courtesy), Northwestern University, Evanston, IL
2011−2012	Assistant Professor, Department of Biomedical Engineering and Department of Ophthalmology (by courtesy), Northwestern University, Evanston, IL
2007–2010	Assistant Professor, Department of Electrical Engineering and Computer Science, University of Wisconsin-Milwaukee, Milwaukee, WI
2006–2007	Postdoctoral Fellow, Department of Biomedical Engineering, Washington University in St. Louis, St. Louis, MO

EDUCATION

2006	Ph.D.	Biomedical Engineering, Texas A&M University, College Station, Texas
2000	M.S.	Biomedical Engineering, Shanghai Jiao Tong University, Shanghai, China
1997	B. E.	Computer Science, Shanghai Jiao Tong University, Shanghai, China
1997	B. E.	Instrumentation Engineering, Shanghai Jiao Tong University, Shanghai, China

HONORS AND AWARDS

2022–	Fellow of American Institute for Medical and Biological Engineering (AIMBE)
2020–	Fellow of Optica (formerly The Optical Society, OSA)
2017	Cozzarelli Prize, PNAS Office, National Academy of Sciences of the USA
2016	2016 SPIE Translational Research Award
2013	Young Investigator Award, Georgia Tech Frontiers in Bioengineering Workshop
2012–2013	Fellow, Searle Center for Teaching Excellence, Northwestern University
2011	National Science Foundation CAREER award
2009–2014	Shaw Scientist Award, The Greater Milwaukee Foundation

PEER-REVIEWED JOURNAL ARTICLES ([§]Corresponding author; [*]Equal contribution)

1. Lisa Beckmann, Zhen Cai, Mathew Margolis, Raymond Fang, Ali Djalilian, and Hao F. Zhang, "Recent advances in optical coherence tomography for anterior segment imaging in small animals and their clinical implications," *The Ocular Surface*, *in press* (2022)
2. Liang Li, Xue Feng, Fang Fang, David A Miller, Shaobo Zhang, Pei Zhuang, Haoliang Huang, Pingting Liu, Junting Liu, Nripun Sredar, Liang Liu, Yang Sun, Xin Duan, Jeffrey L Goldberg, Hao F Zhang, and Yang Hu, "Longitudinal *in vivo* Ca2+ imaging reveals dynamic activity changes of diseased retinal ganglion cells at single-cell level," *Proceedings of the National Academy of Sciences of the USA* 119, e2206829119 (2022)
3. Yang Zhang, Gaoxiang Wang, Peizhou Huang, Edison Sun, Junghun Kweon, Qianru Li, Ji Zhe, Leslie L. Ying, and Hao F. Zhang, "Minimizing molecular misidentification in imaging low-abundance protein interactions using spectroscopic single-molecule localization microscopy," *Analytics Chemistry*, *in press* (2022)
4. Neil A. Nadkarni, Erika Arias, Raymond Fang, Maureen E. Haynes, Hao F. Zhang, William A. Muller, Ayush Batra, David P. Sullivan, "Platelet endothelial cell adhesion molecule (PECAM/CD31) blockade modulates neutrophil recruitment patterns and reduces infarct size in experimental ischemic stroke," *The American Journal of Pathology*, *in press* (2022)

5. Qiangzhou Rong, Youngseop Lee, Yuqi Tang, Tri Vu, Carlos Taboada, Wenhan Zheng, Jun Xia, David A. Czaplewski, Hao F. Zhang, Cheng Sun, and Junjie Yao, "High-frequency three-dimensional photoacoustic computed tomography using an optical micro-ring resonator," *BME Frontiers* 2022, 9891510 (2022)
6. Raymond Fang, Ian Rubinoff, and Hao F. Zhang, "Multiple forward scattering reduces the measured scattering coefficient of whole blood in visible-light optical coherence tomography," *Biomedical Optics Express* 13, 4510-4527 (2022)
7. James D Cole, Kara M McHaney, Behnam Rambiee, Jingyi Gao, Carlos Rodriguez; David A Miller, Mingna Liu, Marta Grannonico, Pedro Norat, Hao F Zhang, Ali R Djalilian, and Xiaorong Liu, "Long-term retinal protection by MEK inhibition in Pax6 haploinsufficiency mice," *Experimental Eye Research* 218, 109012 (2022)
8. Ian Rubinoff, Roman Kuranov, Zeinab Ghassabi, Yuanbo Wang, Lisa Beckmann, David Miller, Behnam Tayebi, Gadi Wollstein, Hiroshi Ishikawa, Joel S. Schuman, Hao F. Zhang, "High-speed balanced-detection visible-light optical coherence tomography in the human retina using subpixel spectrometer calibration," *IEEE Transactions on Medical Imaging* 41, 1724-1734 (2022)
9. Xiaorong Liu and Hao F. Zhang, "Characterization of retinal ganglion cell damage at single axon bundle level in mice by visible-light optical coherence tomography fibergraphy," *Neural Regeneration Research* 18, 135-136 (2022)
10. Ki-Hee Song, Benjamin Brenner, Wei-Hong Yeo, Junghun Kweon, Zhen Cai, Yang Zhang, Youngseop Lee, Xusan Yang, Cheng Sun and Hao F. Zhang, "Monolithic dual-wedge prism-based spectroscopic single-molecule localization microscopy," *Nanophotonics* 11, 1527-1535 (2022)
11. Colleen M. McDowell, Krishnakumar Kizhatil, et al., "Consensus recommendation for mouse models of ocular hypertension to study aqueous humor outflow and its mechanisms." *Investigative Ophthalmology & Vision Science* 63, 12 (2022)
12. Zeinab Ghassabi, Roman V. Kuranov, Joel S. Schuman, Ronald Zambrano, Mengfei Wu, Mengling Liu, Behnam Tayebi, Yuanbo Wang, Ian Rubinoff, Xiaorong Liu, Gadi Wollstein, Hao F. Zhang, and Hiroshi Ishikawa, "In vivo sublayer analysis of uman retinal inner plexiform layer obtained by visible-light optical coherence tomography," *Investigative Ophthalmology & Vision Science* 63, 18 (2022)
13. Marta Grannonico1, David A. Miller, Mingna Liu, Pedro Norat, Christopher D. Deppmann, Peter A. Netland, Hao F. Zhang, Xiaorong Liu, "Global and regional damages in retinal ganglion cell axon bundles monitored by visible-light optical coherence tomography fibergraphy," *Journal of Neuroscience* 41, 10179-10193 (2021)
14. Lisa Beckmann, Zhen Cai, James Cole, David Miller, Mingna Liu, Marta Grannonico, Xian Zhang, Hyun Jung Ryu, Peter A. Netland, Xiaorong Liu, and Hao F. Zhang, "*In vivo* imaging of the inner retinal layer structure in mice after eye-opening using visible-light optical coherence tomography," *Experimental Eye Research* 211, 108756 (2021)
15. Yang Zhang, Yu Zhang, Ki-Hee Song, Wei Lin, Cheng Sun, George Schatz, and Hao F. Zhang, "Investigating single-molecule fluorescence spectral heterogeneity of rhodamines using high-throughput single-molecule spectroscopy," *The Journal of Physical Chemistry Letters* 12, 3914-3921 (2021)
16. Benjamin Brenner, Ki-Hee Song, Cheng Sun, and Hao F. Zhang, "Improving spatial precision and field-of-view in wavelength-tagged single-particle tracking using spectroscopic single-molecule localization microscopy," *Applied Optics* 60, 3647-3658 (2021)
17. Zhen Cai, Yang Zhang, Zheyuan Zhang, Ki-Hee Song, Lisa Beckmann, Ali Djalilian, Cheng Sun, and Hao F. Zhang[§], "Super-resolution imaging of flat-mounted whole mouse cornea," *Experimental Eye Research* 205, 108499 (2021)
18. Sunil Kumar Gaire, Yanhua Wang, Hao F. Zhang, Dong Liang, and Leslie Ying, "Accelerating 3D single-molecule localization microscopy using blind sparse inpainting," *Journal of Biomedical Optics* 26, 026501 (2021)
19. Ian Rubinoff, Roman Kuranov, and Hao F. Zhang[§], "Intrinsic spectrally-dependent background in spectroscopic visible-light optical coherence tomography," *Biomedical Optics Express* 12, 110-124 (2020)
20. Biqing Dong, Ki-Hee Song, Janel L. Davis, Hao F. Zhang, and Cheng Sun, "Sub-10 nm molecular spacing measurement using photon-accumulation enhanced reconstruction (PACER)," *Advanced Photonics Research* 1, 200038 (2020)

21. Pedro Norat, Jingyi Gao, Hao F. Zhang, and Xiaorong Liu, "A call for a standardized crush tool to produce consistent retinal ganglion cell damage in mice," *Neural Regeneration Research* 16, 1442-1443 (2020)
22. David A. Miller, Marta Grannonico, Mingna Liu, Roman V. Kuranov, Peter A. Netland, Xiaorong Liu, and Hao F. Zhang§, "Visible-light optical coherence tomography fibergraphy for quantitative imaging of retinal ganglion cell axon bundles," *Translational Vision Science & Technology* 9, 11 (2020)
23. Janel L. Davis1, Brian Soetikno, Ki-Hee Song, Yang Zhang, Cheng Sun, and Hao F. Zhang§, "RainbowSTORM: An open-source ImageJ plugin for spectroscopic single-molecule localization microscopy (sSMLM) data analysis and image reconstruction," *Bioinformatics* 36, 4972-4974 (2020)
24. Ki-Hee Song, Yang Zhang, Benjamin Brenner, Cheng Sun, and Hao F. Zhang§, "Symmetrically-dispersed spectroscopic single-molecule localization microscopy," *Light: Science and Applications* (by *Nature*) 9, 92 (2020)
25. Ian Rubinoff, Brian Soetikno, David A. Miller, Isabella Rischall, Amani Fawzi, Roman Kuranov, and Hao F. Zhang§, "Spectrally dependent roll-off in visible-light optical coherence tomography," *Optics Letters* 9, 2680-2683 (2020)
26. Sunil K. Gaire, Yang Zhang, Hongyu Li, Ray Yu, Hao F. Zhang, and Leslie Ying, "Accelerating multicolor spectroscopic single-molecule localization microscopy using deep learning," *Biomedical Optics Express* 11, 2705-2721 (2020)
27. Janel L. Davis, Yang Zhang, Sijia Yi, Fanfan Du, Ki-Hee Song, Evan A. Scott, Cheng Sun and Hao F. Zhang§, "Super-resolution imaging of self-assembled nanocarriers using quantitative spectroscopic analysis for cluster extraction," *Langmuir* 36, 2291-2299 (2020)
28. Juliana Falero-Perez, Michele C. Larsen, Leandro B. C. Teixeira, Hao F. Zhang, Volkhard Lindner, Christine M. Sorenson, Colin R. Jefcoate, and Nader Sheibani, "Targeted deletion of Cyp1b1 in pericytes results in attenuation of retinal neovascularization and trabecular meshwork dysgenesis," *Trends in Developmental Biology* 12, 1-12 (2019)
29. Xian Zhang, Lisa Beckmann, David Miller, Guangbin Shao, Zhen Cai, Cheng Sun, Nader Sheibani, Xiaorong Liu, Joel Schuman, Mark Johnson, Tsutomu Kume, and Hao F. Zhang§, "*In vivo* imaging of Schlemm's canal and limbal vascular network in mouse using visible-light OCT," *Investigative Ophthalmology & Visual Science* 61, 23 (2020)
30. Amir Vahabakashi, Ariel Gelman, Biqin Dong, Lihua Gong, Elliott D.K. Cha, Margit Schimmel, Ernst R. Tamm, Kristin Perkumas, W. Daniel Stamer, Cheng Sun, Hao F. Zhang, Haiyan Gong, and Mark Johnson, "Increased stiffness and flow resistance of the inner wall of Schlemm's canal in glaucomatous human eyes," *Proceedings of the National Academy of Sciences of the USA* 116, 26555-26563 (2019)
31. Zheyuan Zhang, Yang Zhang, Cheng Sun, and Hao F. Zhang§, "Machine-learning based spectral classification for spectroscopic single-molecule localization microscopy," *Optics Letters* 44, 5864-5867 (2019) (***Editor's pick***)
32. Lorenzo Sansalone, Yang Zhang, Mercedes M. A. Mazza, Janel L. Davis, Burjor Captain, Hao F. Zhang, and Françisco M. Raymo, "High-Throughput Single-Molecule Spectroscopy Resolves the Conformational Isomers of BODIPY Chromophores," *Journal of Physical Chemistry Letters* 10, 6807-6812 (2019)
33. Hao Li, Biqin Dong, Xian Zhang, Xiao Shu, Xiangfan Cheng, Rihan Hai, David Czaplewski, Hao F. Zhang, and Cheng Sun, "Disposable ultrasound-sensing chronic cranial window by soft nanoimprinting lithography," *Nature Communications* 10, 4277 (2019)
34. Lisa Beckmann, Xian Zhang, Neil A. Nadkarni, Zhen Cai, Ayush Batra, David P. Sullivan, William A. Muller, Cheng Sun, Roman Kuranov, and Hao F. Zhang§, "Longitudinal deep-brain imaging in mouse using visible-light optical coherence tomography through chronic microprism cranial window," *Biomedical Optics Express* 10, 5235-5250 (2019)
35. Ian Rubinoff, Lisa Beckmann, Yuanbo Wang, Amani A. Fawzi, Xiaorong Liu, Jenna Tauber, Katie Jones, Hiroshi Ishikawa, Joel S. Schuman, Roman Kuranov, and Hao F. Zhang§, "Speckle reduction in visible-light optical coherence tomography using scan modulation," *Neurophotonics* 6, 041107 (2019), PMCID: PMC6718816
36. Shoujian Wang, Yiping Liu, Jin Wen Tan, Tiancheng Hu, Hao F. Zhang, Christine M Sorenson, Judith A. Smith, Nader Sheibani, "Tunicamycin-induced photoreceptor atrophy precedes degeneration of retinal

capillaries with minimal effects on retinal ganglion and pigment epithelium cells," *Experimental Eye Research* 187, 107756 (2019)

37. Thomas Smart, Hao Li, Biqin Dong, Rihan Hai, Cheng Sun, Hao F. Zhang, and Raymond Jeanloz, "High-pressure seismology: use of micro-ring resonators for characterizing acoustic emissions," *Applied Physics Letters* 115, 081904 (2019)
38. Ki-Hee Song, Yang Zhang, Gaoxiang Wang, Cheng Sun, and Hao F. Zhang§, "Three-dimensional biplane spectroscopic single-molecule localization microscopy," *Optica* 6, 709-715 (2019)
39. Xiao Shu, Lisa Beckmann, Yuanbo Wang, Ian Rubinoff, Katie Lucy, Hiroshi Ishikawa, Gadi Wollstein, Amani A. Fawzi, Joel S. Schuman, Roman V. Kuranov, and Hao F. Zhang§, "Designing visible-light optical coherence tomography towards clinics," *Quantitative Imaging in medicine and Surgery* 9, 769- 781 (2019), PMCID: PMC6571199
40. Yang Zhang, Ki-Hee Song, Biqin Dong, Janel Davis, Guanbin Shao, Cheng Sun, and Hao F. Zhang§, "Multicolor super-resolution imaging using spectroscopic single-molecule localization microscopy with optimal spectral dispersion," *Applied Optics* 58, 2248-2255 (2019), PMCID: PMC6620783
41. Ellis Y. Kim, David Y. Barefield, Andy H. Vo, Anthony M. Gacita, Emma Schuster, Eugene J. Wyatt, Janel L. Davis, Biqin Dong, Cheng Sun, Patrick Page, Lisa Dellefave-Castillo, Alexis R. Demonbreun, Hao F. Zhang, and Elizabeth M. McNally, "Distinct pathological signatures in human cellular models of myotonic dystrophy subtypes," *The Journal of Clinical Investigation Insight (JCI Insight)* 4, e122686 (2019), PMCID: PMC6482996
42. Ki-Hee Song, Biqin Dong, Cheng Sun, and Hao F. Zhang§, " Theoretical analysis of spectral precision in spectroscopic single-molecule localization microscopy," *Review of Scientific Instruments* 89, 123703 (2018), PMCID: PMC6289825
43. Adam Eshein, Yue Li, Biqin Dong, Luay M. Almassalha, John E. Chandler, The-Quyen Nguyen, Karl A. Hujsak, Vinayak P. Dravid, Cheng Sun, Hao F. Zhang, and Vadim Backman, "Sub-10 nm imaging of nucleic acids using spectroscopic intrinsic-contrast photon-localization optical nanoscopy (SICLON)," *Optics Letters*, 43, 5817-5820 (2018), PMCID: PMC6375679
44. Ben E. Urban, Biqin Dong, Xian Zhang, Huili Yang, and Hao F. Zhang§, "Patterned-illumination second harmonic generation microscopy of collagen fibrils in rat sclera," *Optics Letters* 43, 5190-5193 (2018) (***Editor's pick***)
45. Janel L. Davis, Biqin Dong, Cheng Sun, and Hao F. Zhang§, "Method to identify and minimize artifacts induced by fluorescent impurities in single- molecule localization microscopy," *Journal of Biomedical Optics* 23, 106501 (2018), PMCID: PMC6210800
46. Yang Zhang, Ki-hee Song, Sicheng Tang, Luaura Ravelo, Janet Cusido, Cheng Sun, Hao F. Zhang§, and Francisco M. Raymo, "Far-red photoactivatable BODIPYs for the super-resolution imaging of live cells," *Journal of the American Chemical Society* 140, 12741-12745 (2018)
47. Qi Liu, Siyu Chen, Brian Soetikno, Wenzhong Liu, Shanbao Tong, and Hao F. Zhang§, "Monitoring acute stroke in mouse model using laser speckle imaging-guided visible-light optical coherence tomography," *IEEE Transactions on Biomedical Engineering* 65, 2136-2142 (2018), PMCID: PMC5700853
48. Brian T. Soetikno, Lisa Beckmann, Xian Zhang, Amani A. Fawzi, and Hao F. Zhang§, "Visible-light optical coherence tomography oximetry based on circumpapollary scan and graph-search segmentation," *Biomedical Optics Express* 9, 3640-3652 (2018)
49. Deyan Xie, Qin Li, Quanxue Gao, Wei Song, Hao F. Zhang, and Xiaocong Yuan, "*In vivo* blind-deconvolution photoacoustic ophthalmoscopy with total variation regularization," *Journal of Biophotonics* 11, e201700360 (2018)
50. (*Invited review*) Biqin Dong, Janel L. Davis, Cheng Sun, and Hao F. Zhang§, "Spectroscopic analysis beyond the diffraction limit," *International Journal of Biochemistry and Cell Biology* 101, 113-117 (2018), PMCID: PMC6635922
51. Xiangfan Chen, Wenzhong Liu, Biqin Dong, Jongwoo Lee, Henry Oliver T. Ware, Hao F. Zhang, and Cheng Sun, "High-speed 3D Printing Millimeter-size Customized Aspheric Imaging Lenses with Sub-7 nm Surface Roughness," *Advanced Materials* 30, 1705683 (2018) (***Cover story***)

52. Ben E. Urban, Lei Xiao, Siyu Chen, Biqin Dong, Yevgenia Kozorovitskiy, and Hao F. Zhang§, "Imaging neuronal structure dynamics using two-photon super-resolution patterned excitation reconstruction (SuPER) microscopy," *Journal of Biophotonics* 11, e20170017 (2018)
53. Ben E. Urban, Lei Xiao, Siyu Chen, Huili Yang, Biqin Dong, Yevgenia Kozorovitskiy, and Hao F. Zhang§, "*In vivo* super-resolution imaging of neuronal structure in the mouse brain," *IEEE Transactions on Biomedical Engineering* 65, 232-238 (2018), PMCID: PMC6014725, (***Cover story***)
54. (Invited) Xiao Shu, Lisa Beckmann, and Hao F. Zhang§, "Visible-light optical coherence tomography: a review," *Journal of Biomedical Optics* 22, 121707 (2017), PMCID: PMC5745673
55. Henry Oliver T. Ware, Wenzhong Liu, Jianmin Hu, Hao F. Zhang, and Cheng Sun, "Methodology for image-driven high-resolution additive manufacturing using discretized data Set", *Procedia CIRP* 65, 139-144 (2017)
56. Yanhua Wang, Shu Jia, Hao F. Zhang, Doory Kim, Hazen Bebcock, Xiaowei Zhuang, and Leslie Ying, "Blind sparse inpainting reveals cytoskeletal filaments with sub-Nyquist localization," *Optica* 4, 1277-1284 (2017)
57. Hao Li, Wenzhong Liu, Christine M. Sorenson, Nader Sheibani, Daniel M. Albert, Thulani Senanayake, Serguei Vinogradov, Jack Henkin, and Hao F. Zhang§, "Sustaining intravitreal residence with L-Arginine peptide-conjugated nanocarriers," *Investigative Ophthalmology & Vision Science* 58, 5142-5150 (2017), PMCID: PMC5634351
58. Xiao Shu, Wenzhong Liu, Lian Duan, Hao F. Zhang§, "Spectroscopic Doppler analysis for visible-light optical coherence tomography," *Journal of Biomedical Optics* 22, 121702 (2017), PMCID: PMC5644441
59. Dou Yu, Omar F. Khan, Mario L. Suvà, Biqin Dong, Wojciech K. Panek, Ting Xiao, Meijing Wu, Yu Han, Atique U. Ahmed, Irina V. Balyasnikova, Hao F. Zhang, Sun Cheng, Robert Langer, Daniel G. Anderson, Maciej S. Lesniak, "Multiplexed RNAi therapy against brain tumor-initiating cells via lipopolymeric nanoparticle infusion delays glioblastoma progression," *Proceedings of the National Academy of Sciences of the USA* 114, E6147-E6156 (2017), PMCID: PMC5544292
60. Biqin Dong, Brian T. Soetikno, Xiangfan Chen, Vadim Backman, Cheng Sun, and Hao F. Zhang§, "Parallel three-dimensional tracking of quantum rods using polarization-sensitive spectroscopic photon localization microscopy," *ACS Photonics* 4, 1747-1752 (2017)
61. Peter L Nesper, Brian T Soetikno, Hao F Zhang, and Amani A. Fawzi, "OCT angiography and visible-light OCT in diabetic retinopathy," *Vision Research* 139, 191-203 (2017), PMCID: PMC5723235
62. Brian T. Soetikno, Xiao Shu, Qi Liu, Wenzhong Liu, Siyu Chen, Lisa Beckmann, Amani A. Fawzi, and Hao F. Zhang§, "Optical coherence tomography angiography of retinal vascular occlusions produced by imaging-guided laser photocoagulation," *Biomedical Optics Express* 8, 3571-3582 (2017), PMCID: PMC5560826
63. Xiao Shu, Hao Li, Biqin Dong, Cheng Sun, and Hao F. Zhang§, "Quantifying melanin concentration in retinal pigment epithelium using broadband photoacoustic microscopy," *Biomedical Optics Express* 6, 2851-2865 (2017), PMCID: PMC5480434
64. Lian Duan, Michael D McRaven, Wenzhong Liu, Xiao Shu, Jianmin Hu, Cheng Sun, Ronald S Veazey, Thomas J. Hope, and Hao F. Zhang§, "Colposcopic imaging using visible-light optical coherence tomography," *Journal of Biomedical Optics* 22, 056003 (2017), PMCID: PMC5421648
65. Joel Kaluzny, Hao Li, Wenzhong Liu, Peter Nesper, Justin Park, Hao F. Zhang, and Amani A. Fawzi, "Bayer filter snapshot hyperspectral fundus camera for human retinal imaging," *Current Eye Research* 42, 629-635 (2017), PMCID: PMC5389919
66. Biqin Dong, Luay Almassalha, Brian T. Soetinko, John E. Chandler, The-Quyen Nguyen, Ben E. Urban, Cheng Sun, Hao F. Zhang§, and Vadim Backman, "Stochastic fluorescence switch of nucleic acids under visible light illumination," *Optics Express* 25, 7929-7944 (2017)
67. (Invited) Siyu Chen, Xiao Shu, Peter Nesper, Wenzhong Liu, Amani A. Fawzi, and Hao F. Zhang§, "Retinal oximetry in humans using visible-light optical coherence tomography," *Biomedical Optics Express* 3, 1415-1429 (2017), PMCID: PMC5480553
68. Seungwoon Seo, Lisheng Chen, Wenzhong Liu, Demin Zhao, Kathryn M. Schultz, Amy Sasman, Ting Liu, Hao F. Zhang, Philip J. Gage, and Tsutomu Kume, "Foxc1 and Foxc2 in the neural crest are required for ocular anterior segment development," *Investigative Ophthalmology & Vision Science* 58, 1368-1377 (2017), PMCID: PMC5361455

69. (Invited) Robert A. Linsenmeier and Hao F. Zhang, "Retinal oxygen: from animals to humans," *Progress in Retinal and Eye Research* 58, 115-151 (2017), PMCID: PMC5441959
70. Rongrong Liu, Siyu Chen, Graham Spicer, Hao F. Zhang, Ji Yi, and Vadim Backman, "A theoretical model for optical oximetry at the single-cell level: exploring hemoglobin oxygen saturation through backscattering of single red blood cells," *Journal of Biomedical Optics* 22, 025002 (2017), PMCID: PMC5290596
71. Wenzhong Liu, Shoujian Wang, Ji Yi, Kevin Zhang, Siyu Chen, Christine M. Sorenson, Nader Sheibani, and Hao F. Zhang[§], "Increased inner retinal oxygen metabolism precedes microvascular alterations in rodent model with Type 1 diabetes," *Investigative Ophthalmology & Vision Science* 58, 981-989 (2017), PMCID: PMC5308771
72. Hao Li, Wenzhong Liu, Biqing Dong, Joel V. Kaluzny, Amani A. Fawzi, and Hao F. Zhang[§], "Snapshot hyperspectral retinal imaging using compact spectral resolving detector array," *Journal of Biophotonics* 10, 830-839 (2017), PMCID: PMC5063234
73. Jisheng Xiao, Siyu Chen, Ji Yi, Hao F. Zhang, and Guillermo A. Ameer, "A cooperative copper metal–organic framework-hydrogel system improves wound healing in diabetes," *Advanced Functional Materials* 27, 1604872 (2017), PMCID: PMC5513192
74. (Invited) Biqin Dong, Cheng Sun, and Hao F. Zhang[§], "Optical detection of ultrasound in photoacoustic imaging," *IEEE Transactions on Biomedical Engineering* 64, 4-15 (2017) (***Cover story***), PMCID: PMC5222629
75. Biqin Dong, Xiangfan Chen, Fan Zhou, Chen Wang, Hao F. Zhang, and Cheng Sun, "Gigahertz all-optical modulation using reconfigurable nanophotonic metamolecules," *Nano Letters* 16, 7690-7695 (2016)
76. Andre Childs, Hao Li, Dani Lewittes, Biqin Dong, Wenzhong Liu, Xiao Shu, Cheng Sun, and Hao F. Zhang[§], "Fabricating customized hydrogel contact lens," *Scientific Reports* 6, 34905 (2016), PMCID: PMC5066254
77. Ji Yi, Zhen Puyang, Liang Feng, Lian Duan, Peiji Liang, Vadim Backman, Xiaorong Liu, Hao F. Zhang[§], "Optical detection of early damages in retinal ganglion cells in a mouse model of partial optic nerve crush injury," *Investigative Ophthalmology & Vision Science* 57, 5665–5671 (2016), PMCID: PMC5089219
78. Biqin Dong, Siyu Chen, Fan Zhou, Christina Chan, Ji Yi, Hao F. Zhang, and Cheng Sun, "Real-time functional analysis of inertial microfluidic devices via spectral domain optical coherence tomography," *Scientific Reports* 6, 3225 (2016), PMCID: PMC5020558
79. Siyu Chen, Qi Liu, Xiao Shu, Brian Soetikno, Shanbao Tong, and Hao F. Zhang[§], "Imaging hemodynamic response after ischemia stroke in mouse cortex using visible-light optical coherence tomography," *Biomedical Optics Express* 7, 3377-3389 (2016), PMCID: PMC5030017
80. Yunxiao Zhu, Ryan Hoshi, Siyu Chen, Ji Yi, Chongwen Duan, Robert D. Galiano, Hao F. Zhang, and Guillermo A. Ameer, "Sustained release of stromal cell derived factor-1 from an antioxidant thermoresponsive hydrogel enhances dermal wound healing in diabetes," *Journal of Controlled Release* 238, 114-122 (2016)
81. Biqin Dong[*], Luay Almassalha[*], Yolanda Stypula-Cyrus, Ben E. Urban, T. Quyen Nguyen, Cheng Sun, Hao F. Zhang[§], and Vadim Backman, "Super-resolution intrinsic fluorescence imaging of chromatin utilizing native, unmodified nucleic acids for contrast," *Proceedings of the National Academy of Sciences of the USA* 113, 9716-9721 (2016) (***Cozzarelli Prize, PNAS Office, National Academy of Sciences***)
82. Biqin Dong[*], Luay Almassalha[*], Ben E. Urban[*], T. Quyen Nguyen[*], Satya Khuon, Teng-Leong Chew, Vadim Backman, Cheng Sun, and Hao F. Zhang[§], "Super-resolution spectroscopic microscopy via photon localization," *Nature Communications* 7, 12290 (2016), PMCID: PMC4962472
83. Ben E. Urban, Biqing Dong, Vadim Backman, Cheng Sun, and Hao F. Zhang[§], "Subsurface super-resolution imaging of unstained polymer nanostructures," *Scientific Reports* 6, 28156 (2016), PMCID: PMC4926209
84. Liang Feng, Hui Chen, Ji Yi, John B. Troy, Hao F. Zhang, and Xiaorong Liu, "Long-term protection of retinal ganglion cells and visual function by brain-derived neurotrophic factor in mice with sustained ocular hypertension," *Investigative Ophthalmology & Vision Science*, 57, 3793-802 (2016), PMCID: PMC4961002
85. Siyu Chen, Xiao Shu, Ji Yi, Amani A. Fawzi, and Hao F. Zhang[§], "Dual-band optical coherence tomography using a single supercontinuum laser source," *Journal of Biomedical Optics* 21, 066013 (2016), PMCID: PMC4908275
86. (Invited) Wenzhong Liu and Hao F. Zhang[§], "Photoacoustic imaging of the eye: a mini review," *Photoacoustics* 4, 112-123 (2016), PMCID: PMC5063360

87. Xiao Shu, Magalie Bondu, Biqin Dong, Adrian Podoleanu, Lasse Leick, and Hao F. Zhang§, "Single all fiber-based nanosecond-pulsed supercontinuum source for simultaneous multispectral photoacoustic microscopy and optical coherence tomography," *Optics Letters* 41, 2743-2746 (2016)
88. Ronil Shah, Brian Soetikno, Ji Yi, Wenzhong Liu, Dimitra Skondra, Hao F. Zhang, and Amani A. Fawzi, "Visible-light optical coherence tomography angiography for monitoring laser-induced choroidal neovascularization in mice," *Investigative Ophthalmology & Vision Science* 57, OCT86–OCT95 (2016), PMCID: PMC4968775
89. Wenzhong Liu, Hao Li, Ronil S. Shah, Xiao Shu, Robert A. Linsenmeier, Amani A. Fawzi, and Hao F. Zhang§, "Simultaneous optical coherence tomography angiography and fluorescein angiography in rodents with normal retina and laser-induced choroidal neovascularization," *Optics Letters* 40, 5782-5785 (2015)
90. Brian T. Soetikno, Ji Yi, Ronil Shah, Wenzhong Liu, Patryk Purta, Hao F. Zhang, and Amani A. Fawzi, "Inner retinal oxygen metabolism in the 50/10 oxygen-induced retinopathy model," *Scientific Report* 5, 16752 (2015), PMCID: PMC4649746
91. Hao Li, Wenzhong Liu, and Hao F. Zhang§, "Investigating the influence of chromatic aberration and optical illumination bandwidth on fundus imaging in rats," *Journal of Biomedical Optics* 20, 106010 (2015), PMCID: PMC4881312
92. Xiao Shu, Wenzhong Liu, and Hao F. Zhang§, "A Monte Carlo investigation on quantifying the retinal pigment epithelium melanin concentration by photoacoustic ophthalmoscopy," *Journal of Biomedical Optics* 20, 106005 (2015), PMCID: PMC4881288
93. Ji Yi, Wenzhong Liu, Siyu Chen, Vadim Backman, Nader Sheibani, Christine Sorenson, Amani A. Fawzi, Robert A. Linsenmeier, and Hao F. Zhang§, "Visible light optical coherence tomography measures retinal oxygen metabolic response to systemic oxygenation," *Light: Science & Applications* 4, e334 (2015), PMCID: PMC4674267
94. Ji Yi, Siyu Chen, Xiao Shu, Amani Fawzi, and Hao F. Zhang§, "Human retinal imaging using visible-light optical coherence tomography guided by scanning laser ophthalmoscopy," *Biomedical Optics Express* 6, 3701-3713 (2015), PMCID: PMC4605031, (***No. 1 Top Downloaded Articles on Ophthalmology Applications in 2016***)
95. Wenzhong Liu, Ji Yi, Siyu Chen, Shuliang Jiao, and Hao F. Zhang§, "Measuring retinal blood flow in rats using Doppler optical coherence tomography without knowing eyeball axial length," *Medical Physics* 42, 5356 (2015), PMCID: PMC4545096
96. Siyu Chen, Ji Yi, Wenzhong Liu, Vadim Backman, and Hao F. Zhang§, "Monte Carlo investigation of optical coherence tomography retinal oximetry," *IEEE Transactions on Biomedical Engineering* 62, 2308-2316 (2015), PMCID: PMC4565794
97. Siyu Chen, Ji Yi, and Hao F. Zhang§, "Measuring oxygen saturation in retinal and choroidal circulations in rats using visible light optical coherence tomography angiography," *Biomedical Optics Express* 6, 2840-2853 (2015), PMCID: PMC4541512
98. Ben E. Urban, Ji Yi, Siyu Chen, Biqin Dong, Yongling Zhu, Steven H. DeVries, Vadim Backman, and Hao F. Zhang§, "Super-resolution two-photon microscopy via scanning patterned illumination," *Physical Review E* 91, 042703 (2015)
99. Xiaojing Liu, Tan Liu, Rong Wen, Yiwen Li, Carmen A. Puliafito, Hao F. Zhang and Shuliang Jiao, "Optical coherence photoacoustic microscopy for *in vivo* multimodal retinal imaging," *Optics Letters* 40, 1370-1373 (2015)
100. Hui Chen, Yan Zhao, Mingna Liu, Liang Feng, Zhen Puyang, Ji Yi, Hao F. Zhang, Jianhua Cang, John B Troy and Xiaorong Liu, "Progressive degeneration of retinal and superior collicular functions in mice with sustained ocular hypertension," *Investigative Ophthalmology & Visual Science* 26, IOVS-14-15691 (2015), PMCID: PMC4365983
101. Biqin Dong, Hao Li, Zhen Zhang, Kevin Zhang, Siyu Chen, Cheng Sun, and Hao F. Zhang§, "Isometric multimodal photoacoustic microscopy based on optically transparent micro-ring ultrasonic detection," *Optica* 2, 169-176 (2015), PMCID: PMC5969522
102. Siyu Chen, Ji Yi, Biqin Dong, Cheng Sun, Patrick Kiser, Thomas J. Hope, Hao F. Zhang§, "Imaging endocervical mucus anatomy and dynamics in macaque female reproductive track using optical coherence tomography," *Quantitative Imaging in Medicine and Surgery* 5, 40-45 (2015), PMCID: PMC4312293

103. Zhen Zhang, Biqin Dong, Hao Li, Fan Zhou, Hao F. Zhang, and Cheng Sun, "Theoretical and experimental studies of distance dependent response of micro-ring resonator-based ultrasonic detectors for photoacoustic microscopy," *Journal of Applied Physics* 116, 144501 (2014), PMCID: PMC4214344
104. Wei Song, Qing Wei, Wenzhong Liu, Tan Liu, Ji Yi, Nader Sheibani, Amani Fawzi, Robert A Linsenmeier, Shuliang Jiao, and Hao F. Zhang[§], "A combined method to quantify the retinal metabolic rate of oxygen using photoacoustic ophthalmology and optical coherence tomography," *Scientific Reports* 4, 6525 (2014), PMCID: PMC4185377
105. Ji Yi, Siyu Chen, Vadim Backman, and Hao F. Zhang[§], "*In vivo* functional microangiography by visible-light optical coherence tomography," *Biomedical Optics Express* 5, 3603-3612 (2014), PMCID: PMC4206328
106. Hao Li, Qi Liu, Hongyang Lu, Yao Li, Hao F. Zhang, and Shanbao Tong, "Directly measuring the absolute flow speed by frequency-domain laser speckle imaging," *Optics Express* 22, 21079-21087 (2014)
107. Ben Urban, Ji Yi, Vladislav Yakovlev, and Hao F. Zhang[§], "Investigating femtosecond-laser induced two-photon photoacoustic generation", *Journal of Biomedical Optics* 19, 085001 (2014), PMCID: PMC4118047
108. Biqin Dong, Siyu Chen, Zhen Zhang, Cheng Sun, and Hao F. Zhang[§], "Photoacoustic probe using a micro-ring resonator ultrasonic sensor for endoscopic applications," *Optics Letters* 39, 4372-4375 (2014), PMCID: PMC4560527
109. Wenzhong Liu, Kathryn M. Schultz, Kevin Zhang, Amy Sasman, Fengli Gao, Tsutomu Kume, and Hao F. Zhang[§], "*In vivo* corneal neovascularization imaging by optical-resolution photoacoustic microscopy," *Photoacoustics* 2, 81-86 (2014), PMCID: PMC4083229
110. Wei Song, Qing Wei, Rui Zhang, and Hao F. Zhang[§], "*In vivo* photoacoustic chorioretinal vascular imaging in albino mouse," *Chinese Optics Letters* 12, 051704 (2014)
111. Hao Li[*], Biqing Dong[*], Zhen Zhang, Hao F. Zhang[§], and Cheng Sun, "A transparent broadband ultrasonic detector based on optical micro-ring resonator for functional photoacoustic imaging," *Scientific Reports* 4, 4496 (2014), PMCID: PMC3968454
112. Cuixia Dai, Xiaojing Liu, Hao F. Zhang, Carmen A. Puliafito, and Shuliang Jiao, "Absolute retinal blood flow measurement with a dual-beam Doppler optical coherence tomography," *Investigative Ophthalmology & Visual Science* 54, 7998-8003 (2013), PMCID: PMC3858018
113. Xiaojing Liu, Chia-Hao Wang, Cuixia Dai, Adam Camesa, Hao F. Zhang, and Shuliang Jiao, "Effect of contact lens on optical coherence tomography imaging of rodent retina," *Current Eye Research* 38,1235-1240 (2013)
114. Tan Liu, Hao Li, Wei Song, Shuliang Jiao, and Hao F. Zhang[§], "Fundus camera guided photoacoustic ophthalmoscopy," *Current Eye Research* 38, 1229-1234 (2013), PMCID: PMC3986591
115. Wenzhong Liu, Shuliang Jiao, and Hao F. Zhang[§], "Accuracy of retinal oximetry: a Monte Carlo investigation," *Journal of Biomedical Optics* 18, 066003 (2013), PMCID: PMC3669519
116. Wei Song, Wenzhong Liu, and Hao F. Zhang[§], "Laser-scanning Doppler photoacoustic microscopy based on temporal correlation," *Applied Physics Letters* 102, 203501 (2013), PMCID: PMC3676371
117. Ji Yi, Qing Wei, Wenzhong Liu, Vadim Backman, and Hao F. Zhang[§], "Visible-light optical coherence tomography for retinal oximetry," *Optics Letters* 38, 1796-1798 (2013), PMCID: PMC3986589
118. Wei Song, Qing Wei, Shuliang Jiao, and Hao F. Zhang[§], "Integrated photoacoustic ophthalmoscopy and spectral-domain optical coherence tomography," *Journal of Visualized Experiments* 71, e4390 (2013), PMCID: PMC3582672
119. Wenzhong Liu, Tan Liu, Wei Song, Ji Yi, and Hao F. Zhang[§], "Automatic retinal vessel segmentation based on active contours method in Doppler spectral-domain optical coherence tomography," *Journal of Biomedical Optics* 18, 016002 (2013), PMCID: PMC3537324
120. Wei Song[*], Qing Wei[*], Liang Feng, Vijay Sarthy, Shuliang Jiao, Xiaorong Liu, and Hao F. Zhang[§], "Multimodal photoacoustic ophthalmoscopy in mouse," *Journal of Biophotonics* 6, 505-512 (2013), PMCID: PMC3986594
121. Fan Zhang, Xiangyang Zhang, Chi Tat Chiu, Lixiang Zhou, K. Kirk Shung, Hao F. Zhang, and Shuliang Jiao, "Laser-scanning photoacoustic microscopy with ultrasonic phase array transducer," *Biomedical Optics Express* 3, 2694–2698 (2012), PMCID: PMC3493241
122. Ji Yi, Qing Wei, Hao F. Zhang, and Vadim Backman, "Structured-interference optical coherence tomography," *Optics Letters* 37, 3048–3050 (2012), PMCID: PMC3544536

123. Wei Song*, Qing Wei*, Tan Liu, David Kuai, Janice M. Burke, Shuliang Jiao, and Hao F. Zhang§, "Integrating photoacoustic ophthalmoscopy with scanning laser ophthalmoscopy, optical coherence tomography, and fluorescein angiography for a multimodal retinal imaging platform," *Journal of Biomedical Optics* 17, 061206 (2012), PMCID: PMC3380928, (***Featured article, 2012 top downloads***)

124. Vladislav V. Yakovlev, Georgi I. Petrov, Hao F. Zhang, Gary D. Noojin, Patrick A. Thomas, Michael L. Denton, Benjamin A. Rockwell, and Robert J. Thomas, "Chemically specific imaging through stimulated Raman photoexcitation and ultrasound detection: mini review," *Australian Journal of Chemistry* 65, 260–265 (2012), PMCID: PMC3691871

125. Tan Liu, Qing Wei, Wei Song, Janice M. Burke, Shuliang Jiao, and Hao F. Zhang§, "Near infrared light photoacoustic ophthalmoscopy," *Biomedical Optics Express* 3, 792–799 (2012), PMCID: PMC3345807

126. Xiangyang Zhang, Hao F. Zhang, and Shuliang Jiao, "Optical coherence photoacoustic microscopy: accomplishing optical coherence tomography and photoacoustic microscopy with a single light source," *Journal of Biomedical Optics* 17, 030502 (2012), PMCID: PMC3380948

127. Qing Wei, Tan Liu, Shuliang Jiao, and Hao F. Zhang§, "Image chorioretinal vasculature in albino rats using photoacoustic ophthalmoscopy," *Journal of Modern Optics* 58, 1997–2001 (2011), PMCID: PMC3987921

128. Xiangyang Zhang, Hao F. Zhang, Carman A. Puliafito, and Shuliang Jiao, "Simultaneous *in vivo* imaging of melanin and lipofuscin in the retina with photoacoustic ophthalmoscopy and autofluorescence imaging," *Journal of Biomedical Optics* 16, 080504 (2011), PMCID: PMC3162618

129. (Invited) Hao F. Zhang§, Carman A. Puliafito, and Shuliang Jiao, "Photoacoustic ophthalmoscopy for *in vivo* retinal imaging: current status and prospects," *Ophthalmic Surgery, Lasers & Imaging* 42, S106–S115 (2011), PMCID: PMC3291958

130. Tan Liu, Qing Wei, Jing Wang, Shuliang Jiao, and Hao F. Zhang§, "Combined photoacoustic microscopy and optical coherence tomography can measure metabolic rate of oxygen," *Biomedical Optics Express* 2, 1359–1365 (2011), PMCID: PMC3087592, (*Top download in multimodal imaging*)

131. Xiangyang Zhang, Minshan Jiang, Amani A. Fawzi, Xiang Li, K. Kirk Shung, Carmen A. Puliafito, Hao F. Zhang§, and Shuliang Jiao, "Simultaneous dual molecular contrasts provided by the absorbed photons in photoacoustic microscopy," *Optics Letter* 35, 4018–4020 (2010), PMCID: PMC3293242

132. Vladislav V. Yakovlev, Hao F. Zhang§, Gary D. Noojin, Michael L. Denton, Robert J. Thomas, and Marlan O. Scully, "Stimulated Raman photoacoustic imaging," *Proceedings of the National Academy of Sciences of the USA* 107, 20335–20339 (2010), PMCID: PMC2996670

133. Konstantin Maslov, Hao F. Zhang, Lihong V. Wang, "Photoacoustic generation of focused quasi-unipolar pressure pulses," *Journal of Innovative Optical Health Sciences* 3, 247–253 (2010), PMCID: PMC2997707

134. Minshan Jiang, Xiangyang Zhang, Carmen A. Puliafito, Hao F. Zhang§, and Shuliang Jiao, "Adaptive optics photoacoustic microscopy," *Optics Express* 18, 21770–21776 (2010), PMCID: PMC3289054

135. Oluwaseyi Balogun, Brad Regez, Hao F. Zhang, and Sridhar Krishnaswamy, "Real-time full-field photoacoustic imaging using an ultrasonic camera," *Journal of Biomedical Optics* 15, 021318 (2010)

136. Anthony H. Green, Jing Wang, Zhixing Xie, Hao F. Zhang, and Patrick J. La Riviere, "*In vitro* testing of a protease-sensitive contrast agent for optoacoustic imaging," *Journal of Biomedical Optics* 15, 021315 (2010)

137. Tan Liu, Jing Wang, Georgi I. Petrov, Vladislav V. Yakovlev, and Hao F. Zhang§, "Photoacoustic generation by multiple picoseconds pulse excitations," *Medical Physics* 37, 1518–1521 (2010), PMCID: PMC2848846

138. Jing Wang, Tan Liu, Shuliang Jiao, Ruimin Chen, Qifa Zhou, K. Kirk Shung, Lihong V. Wang, and Hao F. Zhang§, "Saturation effect in functional photoacoustic imaging," *Journal of Biomedical Optics* 15, 021317 (2010), PMCID: PMC3188629

139. Shuliang Jiao, Minshan Jiang, Jianming Hu, Amani Fawzi, Qifa Zhou, Kirk K. Shung, Carmen A. Puliafito, and Hao F. Zhang§, "Photoacoustic ophthalmoscopy for *in vivo* retinal imaging," *Optics Express* 18, 3967–3972 (2010), PMCID: PMC2864517

140. Hao F. Zhang§, Jing Wang, Qing Wei, Tan Liu, Shuliang Jiao, and Carmen A. Puliafito, "Collecting back-reflected light in photoacoustic microscopy," *Optics Express* 18, 1278–1282 (2010), PMCID: PMC2896224

141. Dong Liang, Hao F. Zhang, and Leslie Ying, "Compressed-sensing photoacoustic imaging based on random optical illumination," *International Journal of Functional Informatics and Personalised Medicine* 4, 394–406 (2009), PMCID: PMC3546493

142. Vladislav V. Yakovlev, Georgi I. Petrov, Hao F. Zhang, Gary D. Noojin, Michael L. Denton, Robert J. Thomas, and Marlan O. Scully, "Stimulated Raman scattering: old physics, new applications," *Journal of Modern Optics* 15, 1970–1973 (2009), PMCID: PMC2846720
143. Shuliang Jiao, Zhixing Xie, Hao F. Zhang[§], and Carmen A. Puliafito, "Simultaneous multimodal imaging with integrated photoacoustic microscopy and optical coherence tomography," *Optics Letters* 34, 2961–2963 (2009), PMCID: PMC2883610
144. Zhixing Xie, Shuliang Jiao, Hao F. Zhang[§], and Carmen A. Puliafito "Laser-scanning optical-resolution photoacoustic microscopy", *Optics Letters* 34, 1771–1773 (2009)
145. Zhixing Xie, Lihong V. Wang, and Hao F. Zhang[§], "Optical fluence distribution study in tissue in dark-field confocal photoacoustic microscopy using a modified Monte Carlo convolution method," *Applied Optics* 48, 3205–3212, (2009)
146. Hao F. Zhang, Konstantin Maslov, and Lihong V. Wang, "Automatic algorithm for skin profile detection in photoacoustic microscopy," *Journal of Biomedical Optics* 14, 024050 (2009)
147. Li Li, Hao F. Zhang, Roger J. Zemp, Konstantin Maslov, and Lihong V. Wang, "Simultaneous imaging of a lacZ-marked tumor and microvasculature morphology *in vivo* by dual-wavelength photoacoustic microscopy," *Journal of Innovative Optical Health Sciences* 1, 207–215 (2008), PMCID: PMC2782593
148. Konstantin Maslov[*], Hao F. Zhang[*], Song Hu[*], and Lihong V. Wang, "Optical-resolution photoacoustic microscopy for *in vivo* imaging of single capillaries," *Optics Letters* 33, 929–931 (2008) (***Top 5 download between 2008-2013***)
149. Konstantin Maslov[*], Hao F. Zhang[*], and Lihong V. Wang, "Effects of wavelength-dependent fluence attenuation on the noninvasive photoacoustic imaging of hemoglobin oxygen saturation in subcutaneous vasculature *in vivo*," *Inverse Problems* 23, S113–S122 (2007)
150. Hao F. Zhang[*], Konstantin Maslov[*], and Lihong V. Wang, "*In vivo* imaging of subcutaneous structures using functional photoacoustic microscopy," *Nature Protocols* 4, 797–804 (2007)
151. Hao F. Zhang, Konstantin Maslov, Mathangi Sivaramakrishnan, Gheorghe Stoica, and Lihong V. Wang, "Imaging of hemoglobin oxygen saturation variations in single vessels *in vivo* using photoacoustic microscopy," *Applied Physics Letters* 90, 053901 (2007)
152. Mathangi Sivaramakrishnan, Konstantin Maslov, Hao F. Zhang, George Stoica, and Lihong V. Wang, "Limitations of quantitative photoacoustic measurement of blood oxygenation in small vessels," *Physics in Medicine and Biology* 52, 1349–1361 (2007)
153. Hao F. Zhang, Konstantin Maslov, Meng-Lin Li, George Stoica, and Lihong V. Wang, "*In vivo* volumetric imaging of subcutaneous microvasculature using photoacoustic microscopy," *Optics Express* 14, 9317−9323 (2006)
154. Hao F. Zhang, Konstantin Maslov, George Stoica, and Lihong V. Wang, "Imaging acute thermal burns by photoacoustic microscopy," *Journal of Biomedical Optics* 11, 054033 (2006)
155. Hao F. Zhang[*], Konstantin Maslov[*], George Stoica, and Lihong V. Wang, "Functional photoacoustic microscopy for high-resolution and noninvasive *in vivo* imaging," *Nature Biotechnology* 24, 848−851 (2006)
156. Jung-Taek Oh, Meng-Lin Li, Hao F. Zhang, Konstantin Maslov, Grogre Stoica, and Lihong V. Wang, "Three-dimensional imaging of skin melanoma *in vivo* by dual-wavelength photoacoustic microscopy," *Journal of Biomedical Optics* 11**,** 034032 (2006)
157. Meng-Lin Li, Hao F. Zhang, Konstantin Maslov, and Lihong V. Wang, "Improved *in-vivo* photoacoustic microscopy based on a virtual-detector concept," *Optics Letters* 31, 474−476 (2006)

BOOKS AND BOOK CHAPTERS

1. Brian Soetikno, Lisa Beckmann, and Hao F. Zhang, "*Imaging the living eye*" in *Imaging from Cells to Animals in vivo*, edited by Xavier Intes and Margarida Barroso (Taylor & Francis, 2020)
2. Vadim Backman, Adam Wax, and Hao F. Zhang, *Biophotonics Laboratory* (CRC Press, 2018)
3. Hao F. Zhang and Shuliang Jiao, "*Photoacoustic microscopy and its ophthalmic applications*" in *Emerging Imaging Technologies in Medicine*, edited by Mark A. Anastasio and Patrick J. La Riviere (Taylor & Francis, 2013)

4. Shuliang Jiao and Hao F. Zhang, "*Multimodal microscopy for comprehensive tissue characterization*" in *Advanced Biophotonics: Slicing Tissue with Photons*, edited by Valery Tuchin and Ricky Wang (Taylor & Francis 2012)
5. Hao F. Zhang, Konstantin Maslov, and Lihong V. Wang, "*Dark-field confocal photoacoustic microscopy*" in *Photoacoustic Imaging and Spectroscopy*, edited by Lihong V. Wang (Taylor & Francis, New York, NY, 2008)

RECENT INVITED PRESENTATIONS

1. Invited speaker, *Meshwork & Angle Closure Study Club*, Washington DC (2022)
2. Seminar, Department of Bioengineering, University of California, Los Angeles (2022)
3. Invited Speaker, Hadassah Eye and Vision Innovation (HEVI) Forum, Jerusalem, Israel (2022)
4. Keynote speaker, *ISER/BrightFocus Glaucoma Symposium: New Concepts and Breakthroughs in Glaucoma*, Atlanta, GA (2022)
5. Invited speaker, *Glaucoma Research Foundation: Glaucoma 360 New Horizons Forum*, San Francisco, CA (2022)
6. Invited speaker, *SPIE Photonics West*, San Francisco, CA (2022)
7. Invited speaker, *John F. Anderson Symposium Aniridia-PAX6 and Beyond*…, Charlottesville, VA (2021)
8. Invited speaker, *Meshwork & Angle Closure Study Club*, San Diego, CA (2021)
9. Invited speaker, *9th International OCT Angiography and Advances in OCT*, Rome, Italy (2021)
10. Invited speaker, *SPIE Optical Metrology (Virtual)* (2021)
11. Distinguished Lecture Series Speaker (Virtual), Roski Eye Institute and the Department of Ophthalmology, University of Southern California, Los Angeles, CA (2021)
12. Virtual Seminar, Division of Chemistry & Biological Chemistry, Nanyang Technology University, Singapore (2020)
13. Invited speaker, *IEEE Engineering in Ophthalmology Workshop*, Johns Hopkins University, Baltimore, MD (2020)
14. Seminar, Byers Eye Institute, Stanford University, Palo Alto, CA (2020)
15. Seminar, Department of Ophthalmology and Vision Science, University of Illinois, Chicago, IL (2020)
16. Invited speaker, *7th International OCT Angiography and Advances in OCT*, Rome, Italy (2019)
17. Invited speaker, *Meshwork & Angle Closure Study Club*, Washington DC, (2019)
18. Invited speaker, *John F. Anderson Symposium Aniridia-PAX6 and Beyond*…, Charlottesville, VA (2019)
19. Invited speaker, *International Ocular Circulation Society*, Portland OR, (2019)
20. Seminar, Department of Ophthalmology, University of California, San Diego, CA (2019)
21. Invited speaker, *Association for Research in Vision and Ophthalmology Annual Conference*, Vancouver, Canada (2019)
22. Seminar, Department of Biomedical Engineering and Department of Ophthalmology, University of Virginia, Charlottesville, VA (2019)
23. Invited speaker, *Advances in Optics and Biotechnology, Medicine and Surgery XVI*, Engineering Conferences International (ECI), Mont Tremblant, Quebec, Canada (2019)
24. Distinguished Lecturers in Vision Science, Department of Ophthalmology, The University of Buffalo, Buffalo, NY (2019)

TEACHING

Quarter-long courses at Northwestern University

1. Winter 2020-2023, *BME 308 Introduction to Biomedical Signals and Electrical Circuits*
2. Fall 2011-2019, *BME 305 Introduction to Biomedical Signals and Electrical Circuits*
3. Fall 2011-2022, *BME 333 Modern Optical Microscopy and Imaging*
4. Spring 2011, *EDC1 Engineering Design and Communication*

Semester-long course at University of Wisconsin-Milwaukee

5. Fall 2009 and Spring 2010, *EE301 Electronic Circuits I*
6. Spring 2009, *EE539 Introduction to Nuclear Magnetic Resonance Imaging*
7. Fall 2008, *EE490/890 Introduction to Bio-optical Imaging*
8. Spring 2008 and Fall 2010, *EE490/890 Introduction to Biomedical Optics*
9. Fall 2007, *EE537 Fundamental of Neuroimaging Techniques*

CURRENT GROUP MEMBERS

Research faculty: Roman Kuranov
Postdoctoral fellow: Youngseop Lee, Junghun Kweon, Karla Elisa Trejo Huizar
Ph.D. student: David Miller, Ben Brenner, Raymond Zhang (MSTP), Wei Hong Yeo, Vera Fan, Jailene Silveri, Delan Hao
Research specialist: Kate Chu

PAST GROUP MEMBERS

Postdoctoral fellow/research associate/research assistant professor

Name	Dates	Last known position
Yang Zhang	2017-2022	Assistant Professor, North Carolina State University
Zhen Cai (M.D.)	2019-2021	Physician, Assistant Professor, TongJi Hospital, Wuhan China
Biqin Dong	2012-2018	Associate Professor, Fudan University, Shanghai, China
Xian Zhang	2017-2019	Physician, Assistant Professor, TongJi Hospital, Wuhan China
Hao Li	2013-2018	Optical Engineer, Fluxus Inc., Santa Clara, CA
Ben Urban	2013-2017	Scientist, Colgate-Palmolive, New York, NY
Lian Duan	2015-2017	Google, Mountain View, CA
Ji Yi	2012-2015	Assistant Professor, Department of Biomedical Engineering and Department of Ophthalmology, Johns Hopkins University, Baltimore, MD
Qing Wei	2009-2012	Professor, Section Director, China Automation Research Institute, Xi'an, China.
Fengli Gao	2010-2012	Professor, School of Electronic Engineering, Jilin University, Jilin, China.
Zhixing Xie	2008-2010	Research Assistant Professor, Department of Radiology, University of Michigan, Ann Arbor, MI

Graduate student

Name	Degree	Dates	Thesis and last known position
Ian Rubinoff	Ph.D.	2017-2022	Thesis: Development of clinical of visible-light optical coherence tomography Intuitive Surgical Inc.
Lisa Beckmann	Ph.D.	2016-2021	Thesis: Applications of visible-light optical coherence tomography in the eye and brain Intuitive Surgical Inc.
Ki-Hee Song	Ph.D.	2016-2021	Thesis: Technical advances in spectroscopic single-molecule localization microscopy for improving spatial resolution and spectral precision Principal Investigator, Korea Atomic Energy Research Institute, Korea
Janel Davis	Ph.D.	2015-2020	Thesis: Quantitative analytics for spectroscopic single-molecule localization microscopy GLG Consulting
Brian Soetikno	MD/Ph.D.	2015-2020	Thesis: Advances in optical coherence tomography for retinal oximetry and angiography Fellow, Department of Ophthalmology, Stanford University
Joseph Caffarini	MS	2017-2018	Thesis: Evaluation of low-cost fish-eye lens for potential use in surgical applications Epic, Madison, WI
Xiao Shu	Ph.D.	2013-2018	Thesis: Developing functional optical imaging modalities to study retinal diseases

			Apple Inc., Cupertino, CA
Siyu Chen	Ph.D.	2012-2017	Thesis: Investigating functional extension of optical coherence tomography for spectroscopic analysis of blood oxygen saturation Assistant Professor, Department of Ophthalmology, Oregon Health Science University
Qi Liu	Visiting Ph.D.	2015-2017	Start-up company CEO, Shanghai, China
Jianmin Hu	Visiting Ph.D.	2016-2017	Wuhan University of Technology, Wuhan, China
Wenzhong Liu	Ph.D.	2011-2016	Thesis: Development of functional imaging modalities to investigate complications of retinal oxygen metabolism in early diabetes Facebook, Menlo Park, CA
Kevin Zhang	M.S.	2012-2014	Thesis: Photoacoustic imaging of corneal angiogenesis MSTP student at University of Cincinnati
Tan Liu	Ph.D.	2008-2012	Thesis: *Multimodal imaging based on photoacoustic microscopy* IonQ Inc., Rockville, MD
Wei Song	Visiting Ph.D.	2010-2012	Thesis: *Multimodal retinal imaging in rodent* Associate Professor, ShenZheng University, ShenZheng, China
Jing Wang	Visiting Ph.D.	2008-2010	Thesis: Optical functional imaging of the retina: technical development Host University: Jilin University, China Professor, Xi'an JiaoTong University, Xi'an, China
Joanna Pylvanainen	Visiting M.S.	2011	Host University: University of Turku, Turku, Finland. Product Development Engineer, NKT Photonics, Birkerød, Denmark
Santhosh Yegnaraman	M.S.	2010-2011	Thesis: *Ghost flowmetry: numerical simulation* Application Engineer, Elutions Inc., Waukesha, WI.
Daniel D. Zirbel	M.S.	2008-2011	Thesis: Monte Carlo study of retinal oximetry

Undergraduate student

Name	Dates	Last known position
Erica Albrigo	2021	
Jennifer Ryu	2016-2020	
Isabella Rischall	2018-2020	
Naomi Benson	2018	
Christina Chan	2015	
Eric Y. Yang	2015	
Andre Childs	2014	Ph.D. student, Central Florida University
Chintan Pathak	2012-2014	Ophthalmology resident, University of Wisconsin
Ben Williams	2013	Undergraduate Student, Trinity College
David Qiu	2011-2013	Ph.D. student, Department of Electrical and Computer Engineering, University of Illinois Urbana-Champaign
Steffi Perkins	2012-2013	Ph.D. student, Department of Bioengineering, Stanford University
Edward Jen	2010-2011	
Ryan Frazier	2010	Ph.D. student, Stanford University
Tilman Schmidt	2009	Fulbright undergraduate scholar from Germany
Karanvir S. Kaleka	2009-2010	Electrical Engineer at The Dow Chemical Company, Midland, MI
Alana M. Soehartono	2009-2010	Graduate student, Department of Electrical Engineering and Computer Science, University of Wisconsin-Milwaukee, Milwaukee, WI

Summer high-school student

Name	Dates	Last known position
Jennifer Ryu	2015	Undergraduate student (class of 2020), Northwestern University
Eric Ren	2015	Undergraduate student (class of 2023), University of Illinois Urbana–Champaign
Sophia Liu	2014	Undergraduate student (class of 2019), California Institute of Technology
Daniella Lewittes	2014	Undergraduate student (class of 2019), Northwestern University
Garima Gupta	2012	Undergraduate student (class of 2016), University of Michigan
David Kuai	2011	Undergraduate student (Class of 2015), University of Wisconsin, Madison
Matthew Volpe	2011	Ph.D. student, Harvard University

GROUP MEMBER AWARDS

2022	Jailene Silveri, travel award to attend the AIMBE Public Policy Institute
2022	David Miller, Northwestern University School of Engineering Terminal Year Fellowship
2022	Wei Hong Yeo, Christina Enroth-Cugell Fellowship for Vision and Neuroscience
2022	Ian Ribinoff, Northwestern University Biomedical Engineering Annual Dissertation award
2021	Ian Rubinoff, David A. Miller, and Ben Brenner who respectively received the Joanne G. Angle Travel Grant, Knights Templar Eye Foundation Travel Grant, and Retina Research Foundation/Joseph M. and Eula C. Lawrence Travel Grant to attend ARVO 2021
2021	Junghun Kweon, Research Seed Grant, Illinois Society for Prevention of Blindness
2021	Yang Zhang, NIH/NIGMS R21 grant
2021	Ki-Hee Song, Northwestern University Biomedical Engineering Annual Dissertation award
2021	Ian Rubinoff, Northwestern University Biomedical Engineering Annual Research Progress Award in Imaging and Biophotonics
2021	Dr. Brian Soetikno, Stanford Ophthalmology Advanced Research Residency Program
2021	Ben Brenner, Retina Research Foundation/Joseph M. and Eula C. Lawrence Travel Grant, ARVO
2021	Ian Rubinoff, Joanne G. Angle Travel Grant, ARVO
2021	David Miller, Knights Templar Eye Foundation Travel Grant, ARVO
2020	Ki-Hee Song, Northwestern University Biomedical Engineering Annual Research Progress Award in Imaging and Biophotonics
2020	Brian Soetikno, AUPO/RPB Resident/Fellow Research Forum Award
2019	Isabella Rischall, Northwestern University Undergraduate Research Grant
2019–2021	Ki-Hee Song, Christina Enroth-Cugell and David Cugell Graduate Fellowship in Biomedical Engineering and Visual Neuroscience, Northwestern University
2018–2021	Lisa Backmann, NSF Graduate Fellowship Program
2017	Siyu Chen, Northwestern University Biomedical Engineering Annual Dissertation award
2017	Biqin Dong, PicoQuant Young Investigator Award, SPIE Photonic West 2017
2017	Brian Soetikno, Spring 2017 Amgen Scholars Alumni Travel Award and Biomedical Engineering Annual Research Progress Award
2017–2020	Janel Davis, NSF Graduate Fellowship Program
2016–2021	Brian Soetikno, NIH F30 pre-doctoral fellowship
2016	Wenzhong Liu, Northwestern University Biomedical Engineering Annual Dissertation award
2015	Brian Soetikno, SPIE Optics and Photonics Education Scholarship
2015	Brian Soetikno, Siyu Chen, ARVO Annual Conference Travel Grant
2014	Eric Yang, Northwestern University McCormick Undergraduate Student Summer Research Opportunities Award
2014	Christina Chan, Northwestern University Biomedical Engineering Undergraduate Student Summer Research Award
2014–2016	Ji Yi, Juvenile Diabetes Research Foundation (JDRF) postdoctoral fellow award.

2013–2016	Wenzhong Liu, Howard Hughes Medical Institute (HHMI) International Fellowship, one of 42 in the U.S.A.
2013–2014	Ji Yi, "Non-invasively quantifying retinal oxygen saturation by visible-light optical coherence tomography," Research Seed Grant, Illinois Society for Prevention of Blindness
2013	Chintan Pathak, Northwestern University Biomedical Engineering Undergraduate Student Summer Research Award
2013	Kevin Zhang, Overall Oral Presentation Award, 2013 Chicago Area Undergraduate Research Symposium
2012	Kevin Zhang, Northwestern University Undergraduate Research Grant
2012	David Qiu and Kevin Zhang, *Fifty for the Future* award, Illinois Technology Foundation
2012–2013	Qing Wei, "High-definition choroidal vascular imaging," Research Seed Grant, Illinois Society for Prevention of Blindness
2010	Karanvir S. Kaleka, Outstanding Undergraduate Student Award, College of Engineering & Applied Science, University of Wisconsin-Milwaukee
2010	Tan Liu, 1st Place Grand Award, graduate student poster competition, College of Engineering & Applied Science, University of Wisconsin-Milwaukee