

Curriculum Vitae

Puxiang Lai, Ph.D.

Associate Professor

Department of Biomedical Engineering

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Research Interests

Deep-tissue optical focusing, imaging, and stimulation, as well as their applications in biomedicine, including (but are not limited to)

- Optical wavefront shaping
- Photoacoustic imaging
- Adaptive optics
- Optical microscopy
- Super-depth optical imaging
- Deep-tissue optical focusing, imaging, stimulation, and therapy
- Computing optics
- Applications of artificial intelligence techniques in biomedicine and security

Education and Training

- **NIH Postdoctoral training** Jul. 2010 – Aug. 2015
Department of Biomedical Engineering, Washington University in St. Louis, USA
Mentor: Professor Lihong V. Wang (National Academy of Engineering, USA)
- **Doctor of Philosophy** Sep. 2005 – Jan. 2011
Department of Mechanical Engineering, Boston University, Boston, USA
Advisors: Professor Ronald A. Roy (U. of Oxford, UK) and Professor Todd W. Murray
- **Master of Science** Sep. 2002 – Jul. 2005
Institute of Acoustics, Chinese Academy of Sciences, Beijing, China
Advisors: Professor Bixing Zhang and Professor Chenghao Wang (Academician)

- **Bachelor of Engineering** Sep. 1998 – Jul. 2002
Department of Biomedical Engineering, Tsinghua University, Beijing, China

Academic Positions

- **Associate Professor (tenured)** Jul. 2021 – Present
Biophotonics Lab, Department of Biomedical Engineering, Hong Kong Polytechnic University, Hong Kong SAR, China
- **Visiting Professor** Jun. 2021 – Present
Zhujiang Hospital, Southern Medical University, Guangzhou, China
- **Associate Professor** Jan. 2017 – Present
Hong Kong Polytechnic University Shenzhen Research Institute, Shenzhen, China
- **Assistant Professor (tenure-track)** Sep. 2015 – Jun. 2021
Biophotonics Lab, Department of Biomedical Engineering, Hong Kong Polytechnic University, Hong Kong SAR, China
- **Postdoctoral Research Associate** Jul. 2010 – Aug. 2015
Optical Imaging Laboratory, Department of Biomedical Engineering, Washington University in St. Louis, USA
- **Graduate Research Assistant (Ph.D.)** Sep. 2005 – Jun. 2010
Physical Acoustics Lab, Dept. of Mechanical Engineering, Boston University, USA
- **Graduate Research Assistant (M.S.)** Sep. 2002 – Jul. 2005
Institute of Acoustics, Chinese Academy of Sciences, Beijing, China

PART I TEACHING

Teaching Experience

As Subject Leader:

- BME31121, Fundamentals of Biomedical Instrumentation II (undergraduate core), since 2015-2016 Academic Year
- BME31116, Biosignal Processing (undergraduate core), since 2017-2018 Academic Year
- BME5051, Molecular and Functional Imaging: From Body System to Molecules (graduate core), since 2018-2019 Academic Year

As Guest Lecturer:

- BME6000, Advanced Topics in Biomedical Engineering
- BME6002, Nobel Prize Discoveries and Biomedical Engineering
- BME6010, Advanced Topics in Medical Device and Bioinstrumentation
- SN5119, Healthcare Innovation

Teaching/Learning Grant

- Ministry of Education (教育部), Ten Thousand People's Scheme 2019 (2019年萬人計劃), "2019 臨床醫學影像學暑期實習項目", 92,400 RMB, 合作方: 華科技大學 同濟醫學院附屬協和醫院

PART II RESEARCH

Competitive External Research Grants

- [G1] "Deep-tissue optical focusing towards in vivo by Fast Photoacoustically guided Wavefront Shaping (PAWS)", 2017-2020, 918,597 HKD, Hong Kong Research Grant Council (RGC), Early Career Scheme, No. 25204416, Hong Kong, 2016 (**PI**)
- [G2] "Noninvasive high-resolution optical focusing in deep living biological tissue and its applications", 2017-2020, 580,000 RMB, National Natural Science Foundation of China (NSFC), General Scheme(面上項目), No. 81671726, China, 2016 (**PI**)
- [G3] "Development and application of small-animal whole-body high-speed photoacoustic molecular imaging instrument", 2017-2021, 6,350,000 RMB, National Natural Science Foundation of China (NSFC), National Key Instrumentation Development Scheme(國家重大科研儀器研製項目), No. 81627805, China, 2016 (**Co-PI**; budget 1/3 allocated to me)
- [G4] "Photoacoustic Molecular Imaging of Osteoarthritic Pain - A Proof-of-Concept Study", 2016-2018, 755,898.20 HKD, Health and Medical Research Fund (HMRF), Research Fellowship Scheme, No. 01150087, Hong Kong, 2016 (**Co-I**)
- [G5] "多模光纤快速波前整形技术及其在生物医学成像和传感中的应用前瞻", 2018-2020, 500,000 RMB, Shenzhen Science and Technology Innovation Commission, Shenzhen Basic Research Funding Scheme (基礎研究-自由探索項目), No. JCYJ20170818104421564, Shenzhen, China, 2018 (**PI**)
- [G6] "Development of Aggregation Induced Emission-Boosted Adaptive Optical Microscopy for Enhanced Molecular Imaging", 2019-2020, 1,353,550 HKD, Innovation and Technology Commission (ITC), Innovation and Technology Support Program, Tier 3, No. ITS/022/18, Hong Kong, 2018 (**PI**)

- [G7] "Multiscale photoacoustic molecular imaging for early diagnosis of brain glioma", 2020-2024, 2,970,000 RMB, National Natural Science Foundation of China (NSFC), Key Research Scheme (重點項目), No. 81930048, China, 2019 (**PI**)
- [G8] "Optical focusing through multimode fibers based on reflection mode transmission matrix and its perspectives in biomedicine", 2019-2021, 100,000 RMB, Department of Science and Technology of Guangdong Province (廣東省科學技術廳), General Scheme (面上項目), No. 2019A1515011374, China, 2019 (**PI**)
- [G9] "Optical Fiber Biomedical Sensing and Imaging Technologies (光纤生物学传感及成像技术)", 2020-2025, 20,000,000 RMB (10% allocated to me), Department of Science and Technology of Guangdong Province (廣東省科學技術廳), Local Innovative and Research Teams Project of Guangdong Pearl River Talents Program (廣東特支計劃本土創新創業團隊項目), No. 2019BT02X105, China, 2020 (**Co-PI**; budget 10% allocated to me)
- [G10] "Forward-looking intravascular photoacoustic/ultrasound imaging technology for the assessment and guidance of cardiovascular chronic total occlusion intervention", 2020-2024, 6,179,200 HKD, Hong Kong Research Grant Council (RGC), Research Impact Fund (RIF), No. R5029-19, Hong Kong, 2020 (**Co-PI**; budget 11.6% allocated to me)
- [G11] "Multiscale photoacoustic imaging for small animal myocardial microcirculation evaluation", 2021-2022, 2,110,500 HKD, Innovation and Technology Commission (ITC), Innovation and Technology Fund - Guangdong-Hong Kong Technology Cooperation Funding Scheme (ITF-TCFS), No. GHP/043/19SZ, Hong Kong, 2020 (**PI**)
- [G12] "Fiber-based small animal head-mounted photoacoustic microscopy", 2021-2023, 1,898,915 HKD, Innovation and Technology Commission (ITC), Innovation and Technology Fund - Guangdong-Hong Kong Technology Cooperation Funding Scheme (ITF-TCFS), No. GHP/044/19GD, Hong Kong, 2020 (**PI**)
- [G13] "Spatio-temporally Precise Brain Stimulation with 2-D Flexible Ultrasound Technology", 2021-2023, 2,647,800 HKD, Innovation and Technology Fund - Mainland-Hong Kong Joint Funding Scheme (ITF-MHKJFS), No. MHP/014/19, 2021 (**Co-I**)
- [G14] "Reflective multimode fiber-based wavefront shaping and its *in vitro* demonstrations for minimally invasive high-resolution stimulation and imaging in deep biological tissue", 2022-2024, 563,714 HKD, Hong Kong Research Grant Council (RGC), General Research Fund, No. 15217721, Hong Kong, 2021 (**PI**)

Research Student Supervision

PhD students (in Biomedical Engineering)

- Huanhao Li, defended in February 5, 2021, as chief supervisor
- Fei Cao, defended on June 3, 2021, as co-supervisor
- Zhipeng Yu, defended on June 16, 2021, as chief supervisor
- Yingying Zhou, defended on August 6, 2021, as chief supervisor
- Tianting Zhong, on-going, as chief supervisor
- Xiazi Huang, on-going, as chief supervisor
- Shengfu Cheng, on-going, as chief supervisor
- Qi Zhao, on-going, as chief supervisor
- Chi Man Woo, on-going, as chief supervisor
- Weiran Pang, on-going, as chief supervisor
- Jing Yao, on-going, as chief supervisor
- Lefeng Peng, on-going, as chief supervisor

MPhil students (in Biomedical Engineering)

- Yuchen Song, defended on November 10, 2021, as chief supervisor

MSc students (in Biomedical Engineering)

- Tianting Zhong, graduated in August 2017, as chief supervisor
- Sizhou Guo, graduated in August 2019, as chief supervisor
- Lingwei Lyu, graduated in August 2017, as chief supervisor

Selected Awards and Honors

- Outstanding Reviewer Award of Opto-Electronic Advances (OEA) 2020, July 27, 2021
- 中國圖學學會第七屆理事會優秀學會工作者獎，中國圖學學會， July 4, 2021
- 1st and 2nd Runner-Ups (as the supervisor), The Hong Kong Polytechnic University the BME 3MT Conference 2021, May 2021
- 1st Runner-Up (as the supervisor), The Hong Kong Medical and Healthcare Device Industries Association Student Research Award 2020, December 2020
- The Faculty Merit Award for Outstanding Achievement in Research, The Hong Kong Polytechnic University, Faculty of Engineering, August 2020
- K.C. Wong Belt and Road Visiting Fellowship Scheme, The Hong Kong Polytechnic University, December 2019
- Dr. Kong Footcare Ltd. Scholarship - Best Capstone Project Award (as the supervisor), August 2019

- Research Grant Achievement Award, The Hong Kong Polytechnic University, Faculty of Engineering, March 2018
- Best student poster award (as the supervisor), the 14th International Conference on Photonics and Imaging in Biology and Medicine (PIBM), September 2017
- Hong Kong RGC Early Career Award, October 2016
- 12th National 1000 Talent Plan Youth Scholar, National Natural Science Foundation of China, January 2016
- Seno Medical Best (Oral) Paper Award, Photons Plus Ultrasound: Imaging and Sensing Conference (part of SPIE Photonics West), 2014
- Seno Medical Best (Poster) Paper Award, Photons Plus Ultrasound: Imaging and Sensing Conference (part of SPIE Photonics West), 2014
- Best Poster, 2010 Meeting of the Ultrasonic Industry Association, 2010
- Best Poster, Research and Industrial Collaboration Conference hosted by the National Science Foundation (NSF), Bernard M. Gordon Center of Subsurface Sensing and Imaging Systems, 2007
- Graduate Research Fellowship, Boston University, 2006 – 2010
- Dean's Fellowship, Boston University, 2005 – 2006
- Graduate Research Fellowship, Chinese Academy of Sciences, 2002 – 2005

Peer Reviewed Journal Publications

[] represents equal contribution, # represents corresponding authorship.

- [J1] [**Puxiang Lai**, Lidai Wang, Jian Wei Tay], and Lihong V. Wang[#], "Photoacoustically guided wavefront shaping (PAWS) for enhanced optical focusing in scattering media," *Nature Photonics* 9, 126-132 (2015).
- [J2] [Yan Liu, **Puxiang Lai**], Cheng Ma, Xiao Xu, Alexandra Grabar, and Lihong V. Wang[#], "Optical focusing deep inside dynamic scattering media with near-infrared time-reversed ultrasonically encoded (TRUE) light," *Nature Communications* 6:5904 (2015).
- [J3] [Tianting Zhong, Zhihai Qiu], Yong Wu, Jinghui Guo, Huanhao Li, Zhipeng Yu, Shengfu Cheng, Yingying Zhou, Jiejun Zhu, Jie Tian[#], Lei Sun[#], and **Puxiang Lai**[#], "Optically selective neuron stimulation with a wavefront shaping-empowered multimode fiber", *Advanced Photonics Research (In press)*
- [J4] [Shengfu Cheng, Yingying Zhou], Jiangbo Chen, Huanhao Li, Lidai Wang[#], and **Puxiang Lai**[#], "High-resolution photoacoustic microscopy with deep penetration through learning", *Photoacoustics (In press)*
- [J5] [Yingying Zhou, Junguo Ni], Chunyi Wen[#], and **Puxiang Lai**[#], "Light on Osteoarthritic Joint: From Bench to Bed ", *Theranostics (In press)*

- [J6] Yachao Zhang, Yue Wang, **Puxiang Lai**, and Lidai Wang[#], "Video-rate dual-modal wide-beam harmonic ultrasound and photoacoustic computed tomography", *IEEE Transactions on Medical Imaging (TMI)*, DOI: 10.1109/TMI.2021.3122240 (2021)
- [J7] [Yingying Zhou, Chao Liu, Xiazi Huang], Xiang Qian, Lidai Wang[#], and **Puxiang Lai**[#], "A low-consumption photoacoustic method to measure liquid viscosity", *Biomedical Optics Express* 12(11), 7139-7148 (2021)
- [J8] [Linyun He, Yachao Zhang], Jiangbo Chen, Gongyuan Liu, Jingyi Zhu, Xiaozhen Li, Dengfeng Li, Yuqi Yang, Chun-Sing Lee, Jiahai Shi, Chao Yin[#], **Puxiang Lai**[#], Lidai Wang[#], and Chihua Fang[#], "Multifunctional targeted nanoprobe with high NIR-II PAI/MRI performance for precise theranostics of orthotopic early-stage hepatocellular carcinoma", *Journal of Materials Chemistry B*, DOI: 10.1039/D1TB01729B (2021)
- [J9] Fengyan Song, Chunhuan Zhang, Haiyun Dong, Yuqin Fan, Ming-Yu Wu, Guogang Shan, **Puxiang Lai**, Hui Gao, Yong Sheng Zhao, and Sijie Chen, "A switchable multimode microlaser based on an AIE microsphere", *Journal of Materials Chemistry C* 9, 11180-11188 (2021)
- [J10] [Yunqi Luo, Suxia Yan, Huanhao Li], **Puxiang Lai**[#], and Yuanjin Zheng[#], "Towards smart optical focusing: Deep learning-empowered dynamic wavefront shaping through nonstationary scattering media", *Photonics Research* 9(8), B262-278 (2021)
- [J11] [Dean Yuan, Jiawei Luo], Daixuan Wu, Runsen Zhang, **Puxiang Lai**[#], Zhaohui Li, and Yucheng Shen[#], "Single-shot ultrasound-modulated optical tomography with enhanced speckle contrast", *Optics Letters* 46(13), 3095-3098 (2021)
- [J12] [Chi Man Woo, Huanhao Li], Qi Zhao, and **Puxiang Lai**[#], "Dynamic mutation enhanced particle swarm optimization for optical wavefront shaping", *Optics Express* 29(12), 18420-18426 (2021)
- [J13] [Shuo Qi, Yachao Zhang, Gongyuan Liu], Jiangbo Chen, Xiaozhen Li, Yuqi Yang, Jiahai Shi, Chun-Sing Lee, Guangyu Zhu[#], **Puxiang Lai**[#], Lidai Wang[#], and Chihua Fang[#], "Plasmonic-doped melanin-mimic for CXCR4-targeted NIR-II photoacoustic computed tomography-guided photothermal ablation of orthotopic hepatocellular carcinoma", *Acta Biomaterialia* 129, 245-257 (2021)
- [J14] **Puxiang Lai**, Liming Nie, and Lidai Wang, Special issue "Photoacoustic imaging: microscopy, tomography, and their recent applications in biomedicine" in *visual computation for industry, biomedicine, and art*, *Visual Computation for Industry, Biomedicine, and Art* 4, 16 (2021) (<https://doi.org/10.1186/s42492-021-00082-0>)

- [J15] [Qi Zhao, Chi Man Woo], Huanhao Li, Tianting Zhong, Zhipeng Yu[#], and **Puxiang Lai**[#], "Parameter-free optimization algorithm for iterative wavefront shaping", *Optics Letters* 46(12), 2880-2883 (2021)
- [J16] Honglin Liu[#], **Puxiang Lai**[#], and Shensheng Han, "Influence of anisotropy factor on the memory effect: a systematic study", *Optik* 166366 (2021)
- [J17] [Huanhao Li, Chi Man Woo], Tianting Zhong, Zhipeng Yu, Yunqi Luo, Yuanjin Zheng, Xin Yang, Hui Hui[#], and **Puxiang Lai**[#], "Adaptive optical focusing through perturbed scattering media with dynamic mutation algorithm", *Photonics Research* 9(2), 202-212 (2021)
- [J18] Jingwei Xu, Xiaju Cheng, Fuxian Chen, Weijie Li, Xiaohui Xiao, **Puxiang Lai**, Guopeng Xu, Li Xu, and Yue Pan[#], "Fabrication of Multifunctional PDA-Coated Gold Nanobones for PA/CT Imaging and Enhanced Synergistic Chemo-photothermal Therapy", *Journal of Materials Science & Technology* 63, 97-105, (2021)
- [J19] [Xiazi Huang, Yingying Zhou], Chi Man Woo, Yue Pan, Liming Nie, and **Puxiang Lai**[#], "Multifunctional layered black phosphorene-based nanoplatforam for disease diagnosis and treatment: a review", *Frontiers of Optoelectronics* 13(4): 327-351, (2020)
- [J20] Shasha Wang, Ronghe Chen, Qian Yu, Wenchao Huang, **Puxiang Lai**, Jianxin Tang[#], and Liming Nie[#], "Near-Infrared Plasmon-Boosted Heat/Oxygen Enrichment for Reversing Rheumatoid Arthritis with Metal/Semiconductor Composites", *ACS Applied Materials & Interfaces* 12(41), 45796–45806 (2020)
- [J21] Li Jin, Jun Zhou, and **Puxiang Lai**[#], "Tunable absorption characteristics in multilayered structures with graphene for biosensing", *Journal of Innovative Optics in Health Sciences* 13(4), 2050017 (2020) (*Cover article*)
- [J22] [Zihao Li, Zhipeng Yu, Hui Hui], Huanhao Li, Tianting Zhong, Honglin Liu, and **Puxiang Lai**[#], "Edge enhancement through scattering media enabled by optical wavefront shaping", *Photonics Research* 8(6), 954-962 (2020)
- [J23] [Yingying Zhou, Fei Cao], Huanhao Li, Xiazi Huang, Dongshan Wei, Lidai Wang[#], and **Puxiang Lai**[#], "Photoacoustic imaging of microenvironmental changes in facial cupping therapy", *Biomedical Optics Express* 11(5), 2394-2401 (2020).
- [J24] Engui Zhao, **Puxiang Lai**, Yongjun Xu, Gang Zhang, and Sijie Chen[#], "Fluorescent Materials with Aggregation-Induced Emission (AIE) Characteristics for Array-Based Sensing Assay", *Frontiers in Chemistry* 8, 288 (2020)

- [J25] Yingying Zhou, Siyi Liang, Mingsheng Li, Jianbo Chen, Chengbo Liu, **Puxiang Lai**[#], and Lidai Wang[#], "Optical-resolution photoacoustic microscopy with ultrafast dual-wavelength excitation", *Journal of Biophotonics* 13(6), e201960229 (2020).
- [J26] [Xiazi Huang, Wenting Shang], Han Deng, Yingying Zhou, Fei Cao, Chihua Fang, **Puxiang Lai**[#], and Jie Tian[#], "Clothing Spiny Nanoprobes against the Mononuclear Phagocyte System Clearance *in vivo*: Photoacoustic Diagnosis and Photothermal Treatment of Early Stage Liver Cancer with Erythrocyte Membrane-Camouflaged Gold Nanostars", *Applied Materials Today* 18, 100484 (2020).
- [J27] [Yunqi Luo, Suxia Yan, Huanhao Li], **Puxiang Lai**[#], and Yuanjin Zheng[#], "Focusing light through scattering media by reinforced hybrid algorithms", *APL Photonics* 5(1), 016109 (2020)
- [J28] Meijun Chen, Honglin Liu[#], Zhentao Liu, **Puxiang Lai**, and Shensheng Han, "Expansion of the FOV in speckle autocorrelation imaging by spatial filtering", *Optics Letters* 44(24), 5997-6000 (2019)
- [J29] Yingying Zhou, Jianbo Chen, Mingsheng Li, **Puxiang Lai**[#], and Lidai Wang[#], "Single-shot linear dichroism optical-resolution photoacoustic microscopy", *Photoacoustics* 16, 100148 (2019)
- [J30] Z. Liu, M. Au, X. Wang, P-M B. Chan, **P. Lai**, L. Sun, Y. Zheng, L. Rong, and C. Wen[#], "Photoacoustic imaging of synovial tissue hypoxia in experimental post-traumatic osteoarthritis", *Progress in Biophysics and Molecular Biology* 148(11), 12-20 (2019).
- [J31] Huanhao Li, Fei Cao, Yingying Zhou, Zhipeng Yu, and **Puxiang Lai**[#], "Interferometry-free noncontact photoacoustic detection method based on speckle correlation change", *Optics Letters* 44(22), 5481-5484 (2019).
- [J32] Kaiyi Zhu, Borui Zhou, Yueyue Lu, **Puxiang Lai**, Shulian Zhang, and Yidong Tan[#], "Ultrasound modulated laser feedback tomography in reflective mode", *Optics Letters* 44 (22), 5414-5417 (2019)
- [J33] **Puxiang Lai**[#], YongKeun Park, "Introduction to the special issue on high-resolution optical focusing and imaging within or through thick scattering media", *Journal of Innovative Optical Health Sciences* 12 (4), 1902002 (2019).
- [J34] Tian Zhong, Zhipeng Yu, Huanhao Li, Zihao Li, Haohong Li, and **Puxiang Lai**[#], "Active wavefront shaping for controlling and improving multimode fiber sensor", *Journal of Innovative Optical Health Sciences*, 12(4), 1942007 (2019).

- [J35] Shengfu Cheng, Huanhao Li, Yunqi Luo, Yuanjin Zheng, and **Puxiang Lai**[#], "Artificial intelligence-assisted light control and computational imaging through scattering media", *Journal of Innovative Optical Health Sciences*, 12 (4), 1930006 (2019).
- [J36] Y. Liu, H. Liu, H. Yan, Y. Liu, J. Zhang, W. Shan, **P. Lai**, H. Li, L. Ren, Z. Li, and L. Nie[#], "Aggregation-Induced Absorption Enhancement for Deep Near-Infrared II Photoacoustic Imaging of Brain Gliomas In Vivo," *Advanced Science* 6, 1801615 (2019).
- [J37] Zhipeng Yu, Meiyun Xia, Huanhao Li, Tianting Zhong, Fangyuan Zhao, Hao Deng, Zihao Li, Daifa Wang, and **Puxiang Lai**[#], "Implementation of digital optical phase conjugation with embedded calibration and phase rectification", *Scientific Reports* 9, 1537 (2019)
- [J38] Z. Song, S. Yan, Z. Zang, Y. Fu, D. Wei[#], H-L Cui, and **P. Lai**, "Temporal and spatial variability of water status in plant leaves by terahertz imaging", *IEEE Transactions on Terahertz Science and Technology* 8, 250-527 (2018).
- [J39] J-H Park, Z. Yu, K. Lee, **P. Lai**, and Y. Park[#], "Perspective: Wavefront shaping techniques for controlling multiple light scattering in biological tissues: toward *in vivo* applications", *APL Photonics* 3(10), 100901 (2018).
- [J40] Z. Yu, J. Huangfu, F. Zhao, M. Xia, X. Wu, X. Niu, D. Li, **P. Lai**[#], and D. Wang[#], "Time-reversed magnetically controlled perturbation (TRMCP) optical focusing in scattering media", *Scientific Reports* 8, 2927 (2018).
- [J41] Zhipeng Yu, Huanhao Li, and **Puxiang Lai**[#], "Wavefront shaping and its application to enhance photoacoustic imaging", *Journal of Applied Sciences* 7, 1320 (2017).
- [J42] Fei Cao, Zihai Qiu, Huanhao Li, and **Puxiang Lai**[#], "Photoacoustic imaging in oxygen detection," *Journal of Applied Sciences* 7, 1262 (2017).
- [J43] [**P. Lai**, X. Xu], and L. V. Wang[#], "Dependence of optical scattering from Intralipid in gelatin-gel based tissue-mimicking phantoms on mixing temperature and time," *Journal of Biomedical Optics* 19(3), 035002 (2014).
- [J44] [J. W. Tay, **P. Lai**], Y. Suzuki, and L. V. Wang[#], "Ultrasonically encoded wavefront shaping for focusing into random media," *Scientific Reports* 4, 3918 (2014).

- [J45] Q. Yang, X. Xu, **P. Lai**, D. Xu and L. V. Wang[#], "Time-reversed ultrasonically encoded optical focusing using two ultrasonic transducers for improved ultrasonic axial resolution," *Journal of Biomedical Optics* 18(11), 110502-110502 (2013).
- [J46] [**P. Lai**, Y. Suzuki, X. Xu], and L. V. Wang[#], "Focused fluorescence excitation with time-reversed ultrasonically encoded light and imaging in thick scattering media," *Laser Physics Letters*, 10(7), 075604 (2013).
- [J47] [Y. Suzuki, **P. Lai**], X. Xu, and L. V. Wang[#], "High-sensitivity ultrasound-modulated optical tomography with a large area photorefractive polymer," *Optics Letters*, 38(6), 899-901 (2013).
- [J48] Y. Suzuki, X. Xu, **P. Lai**, and L. V. Wang[#], "Energy enhancement in time-reversed ultrasonically encode optical focusing using a photorefractive polymer," *Journal of Biomedical Optics*, 17(8), 080507 (2012).
- [J49] **P. Lai**, X. Xu, and L. V. Wang[#], "Ultrasound-modulated optical tomography at new depth," *Journal of Biomedical Optics* 17(6), 066006 (2012).
- [J50] **P. Lai**, X. Xu, H. Liu, and L. V. Wang[#], "Time-reversed ultrasonically encoded optical focusing in biological tissue," *Journal of Biomedical Optics* 17(3), 036001 (2012).
- [J51] T. W. Murray[#], **P. Lai**, and R. A. Roy, "Measuring tissue properties and monitoring therapeutic responses using acousto-optic imaging," *Annals of Biomedical Engineering* 40(2), 474-485 (2012).
- [J52] **P. Lai**, X. Xu, H. Liu, Y. Suzuki, and L. V. Wang[#], "Reflection-mode time-reversed ultrasonically encoded optical focusing into turbid media," *Journal of Biomedical Optics* 16 (8), 080505 (2011).
- [J53] H. Liu, X. Xu, **P. Lai**, and L. V. Wang[#], "Time-reversed ultrasonically encoded optical focusing into tissue-mimicking media with thickness up to 70 mean free paths," *Journal of Biomedical Optics* 16(8), 086009 (2011).
- [J54] **P. Lai**, J. R. McLaughlan, A. B. Draudt, T. W. Murray, R. O. Cleveland, and R. A. Roy[#], "Real time monitoring of high intensity focused ultrasound lesion formation using acousto-optic sensing," *Ultrasound in Medicine and Biology* 37(2), 239-252 (2011).
- [J55] **P. Lai**, R. A. Roy, and T. W. Murray[#], "Quantitative characterization of turbid medium using pressure contrast acousto-optic imaging," *Optics Letters* 34(18), 2850-2852 (2009).

- [J56] **P. Lai**, B. Zhang[#], and C. Wang[#], "Radiation and reflection acoustical fields of an annular phased array," *Chinese Journal of Acoustics* 26(3), 246-260 (2007).
- [J57] **赖溥祥**, 张碧星[#], 汪承灏, "环形相控阵换能器辐射和反射声场", *声学学报* 32(3), 212-220 (2007) (*in Chinese*).
- [J58] B. Zhang, C. Wang, and **P. Lai**, "Theoretical and experimental investigation of ultrasonic focusing with annular phased array," *Chinese Physics Letters* 23(4), 875-878 (2006).

Non-Peer Reviewed Articles

- X. Xu, **P. Lai**, and L. V. Wang, "Focusing light into tissue," *SPIE Newsroom*, August 28, (2013), DOI: 10.1117/2.1201308.004937.

Patents

- 1) **赖溥祥**, 赵麒, 李焕浩, 余志鹏, "一种基于光学散斑的加密人脸识别系统", 中国专利 (November 2, 2021)
- 2) **赖溥祥**, 孙雷, 仲天庭, 丘志海, "一种光遗传学实验方法与系统", 中国专利, 申请号 CN201911184827.1 (June 15, 2021)
- 3) **Puxiang Lai**, Lei Sun, Tian Zhong, and Zhihai Qiu, "Method and system for optogenetics experiments", US Patent No. 20210154489A1 (May 27, 2021)
- 4) Lihong V. Wang, Lidai Wang, Chi Zhang, **Puxiang Lai**, and Jian Wei Tay, "Systems and Methods of Grueneisen-Relaxation Photoacoustic Microscopy and Photoacoustic Wavefront Shaping", International Patent Number WO 2015/077355 A1/ US Patent No. 20160305914A1 (2016).

Book Chapters

- 1) Junfei Zhu, Chuen Kam, Engui Zhao, Puxiang Lai, and Sijie Chen, "Fluorescent sensors based on aggregation-induced emission nanomaterials" in "Sensing and Biosensing with Optically Active Nanomaterials", Elsevier (2021)
- 2) (*Invited*) Yingying Zhou, Xiazi Huang, and **Puxiang Lai**, "光声成像系统在肝脏肿瘤边界界定的研究" in 《数字化肝脏外科学》, 人民卫生出版社(*in press*)
- 3) (*Invited*) Xiao Xu, Cheng Ma, **Puxiang Lai**, and Lihong V. Wang, "Wavefront-engineered optical focusing into scattering media using ultrasound- or perturbation-based guide stars: TRUE, TRAP, SEWS, and PAWS", in "Wavefront Shaping for Biomedical Imaging", doi:10.1017/9781316403938, Cambridge University Press (2019).

Invited Seminars/Lectures

- [S1] Shanghai Jiatong University, Department of Biomedical Engineering, Shanghai, China, 2021
- [S2] Central South University, Department of Biomedical Engineering, Changsha, China, 2020
- [S3] Pengcheng Lab, Shenzhen, China, 2020
- [S4] Ningbo University, School of Physical Science and Technology, Ningbo, China, 2020
- [S5] Guangzhou Renmin Hospital/Guangdong Academy of Medical Sciences, Guangzhou, China, 2020
- [S6] Tsinghua Shenzhen International Graduate School, Shenzhen, China, 2019/2020
- [S7] Southern University of Science and Technology, Department of Biomedical Engineering, 2019
- [S8] Peking University, Department of Physics, 2019
- [S9] South China Normal University, South China Academy of Advanced Optoelectronics, Centre for Optical and Electromagnetic Research, 2019
- [S10] Sun Yat-Sen University, School of Electronic and Information Technology, 2019
- [S11] Chinese Academy of Sciences, Shenzhen Institutes of Advanced Technology, 2019
- [S12] Ming Wai Lau Center for Reparative Medicine, Karolinska Institutet, Hong Kong, 2018
- [S13] Huazhong University of Science and Technology, Tongji Medical School, Union Hospital, 2018
- [S14] Dongguan University of Technology, School of Electrical Engineering and Intelligentization, 2018
- [S15] Chinese Academy of Sciences, Institute of Acoustics, 2018
- [S16] Shenzhen University, Nanophotonics Research Center, 2017
- [S17] Jinan University, Institute of Photonics Technology, 2017
- [S18] Chinese Academy of Sciences, Institute of Automation, 2017
- [S19] Beihang University, School of Biological Science and Medical Engineering, 2015
- [S20] Tsinghua University Graduate School at Shenzhen, Institute of Biomedical Engineering, 2015
- [S21] Chinese Academy of Sciences, Shenzhen Institutes of Advanced Technology, 2015
- [S22] South University of Science and Technology of China, Department of Biology, 2015
- [S23] Zhejiang University, College of Optical Science and Engineering, 2015
- [S24] Tsinghua University, Department of Precision Instrument, 2015

- [S25] Peking University, Department of Biomedical Engineering, 2015
- [S26] Duke University, Department of Biomedical Engineering, 2015
- [S27] Chinese Academy of Sciences, Institute of Acoustics, 2013
- [S28] Chinese Academy of Sciences, Institute of Acoustics, 2009

Invited Conference Presentations

- [P1] "Shining new lights into deep biological tissue via wavefront shaping: a brief review of recent development and perspectives", International Conference on Biomedical and Health Informatics (ICBHI) 2021, November 12, 2021
- [P2] "Wavefront shaping-empowered high-resolution optical focusing and stimulation at depths in biological tissue", SPIE Advanced Biophotonics Conference (ABC) 2021, Korea, November 6, 2021
- [P3] "Recent development of optical wavefront shaping towards robust and optimum optical focusing and stimulation at depths in biological tissue", SPIE Photonics Asia 2021, Nantong, China, October 12, 2021
- [P4] "散射光波前整形迭代式优化算法的效率和适应能力探索", 2021 国际计算成像会议, Hangzhou, September 26, 2021
- [P5] "基于深度学习的深穿透光学分辨率光声显微成像", 2021 中国光学学会学术大会, Shenzhen, China, September 20, 2021
- [P6] "Wavefront shaping empowered high-resolution optical focusing at depths in tissue and its application for single neuron optogenetics", 26th Optoelectronic and Communications Conference (OECC2021), Hong Kong SAR, China, July 7, 2021
- [P7] "基于波前整形和光声效应的生物组织深层高分辨光学成像和操控: 一些进展", 第十六届全国激光技术与光电子学学术会议, Shanghai, China, 2021
- [P8] "基于波前整形赋能多模光纤的小动物颅下单神经元刺激", 机器视觉与智能光电检测技术及应用研讨会, Nanjing, China, 2021
- [P9] "光声成像及其在小动物模型早期肿瘤诊断方面的应用研究", 第十二届海峡两岸超声医学高端论坛, Wuhan, China, 2021 (Plenary talk)
- [P10] "光声多模态跨尺度成像", 第二届国际数字智能化诊疗技术大会, Guangzhou, China, 2021

- [P11] "Deep-tissue optical focusing and its applications: Continuing efforts", 第四届光学青年科学家论坛, Ningbo, China, 2020
- [P12] "Recent development in wavefront shaping-enabled optical focusing and its application towards deep-tissue single neuron stimulation", in Photonics Asia, Holography, Diffractive Optics, and Applications X, Beijing, China (2020) (online)
- [P13] "Photoacoustic Diagnosis and Photothermal Treatment of Early Stage Liver Cancer in vivo assisted by Red Blood Cell Membrane Camouflaged Gold Nanostars", 中華醫學會第十次全國數字醫學學術年會, 2020 (online)
- [P14] "COVID-19 and shining new light into body: Deep-tissue optical focusing, imaging, and stimulation empowered by wavefront shaping and photoacoustics", Zhejiang University OSA-SPIE Day of Light Seminar, 2020 (online)
- [P15] "Photoacoustic imaging: principles, implementations, and its preliminary applications", 2019 年分子影像湖北省重點實驗室年會, Wuhan, China, 2019
- [P16] "High-resolution optical focusing, imaging, and control at depths in tissue", in 2019 China Biomedical Engineering Conference, Jinan, China, 2019
- [P17] "Generalization of deep-learning-based image reconstruction from varied sampled speckles", in SPIE Photonics Asia, Hangzhou, China, 2019
- [P18] "Enhanced Mice Liver Cancer Photoacoustic Diagnosis and Photothermal Treatment with Red Blood Cell Membrane Camouflaged Gold Nanostars", in 2019 International Conference on Molecular Imaging and Minimally Invasive Therapy, Beijing, China, 2019
- [P19] "Optical imaging through scattering media based on wavefront shaping and deep learning", the International Forum on Microscopy 2019, Beijing, China, 2019
- [P20] "Synergy of light and sound for high-resolution optical focusing, imaging, and stimulation through and within scattering media", SPIE Optics + Photonics, San Diego, USA, 2019
- [P21] "Enhanced in situ Liver Cancer Photoacoustic Imaging and Photothermal Therapy in Mice with Red Blood Cell Membranes Camouflaged Gold Nanostars", the 19th IEEE International Conference on Nanotechnology, Macau, China, 2019
- [P22] "Wavefront shaping-enabled optical focusing and its application towards deep-tissue single neuron stimulation", Annual ShanghaiTech Symposium on Information Science and Technology, Shanghai, China, 2019

- [P23] "Photoacoustic Diagnosis and Photothermal Treatment of Early Stage Liver Cancer in vivo assisted by Red Blood Cell Membranes Camouflaged Gold Nanostars", 首屆國際數字智能化診療技術大會, Guangzhou, China, 2019
- [P24] "Synergy of light and sound for deep-tissue optical imaging and focusing", the 177th Meeting of the Acoustical Society of America, Louisville, KY, USA, 2019
- [P25] "Deep-tissue optical diagnosis, treatment, and stimulation enabled by photoacoustics and wavefront shaping", 中國生物醫學工程學會第二屆生物醫學光子學分會會員代表大會暨學術交流會, Haikou, China, 2019
- [P26] "腫瘤及其邊界的光聲成像", 中華醫學會第八次全國數字醫學學術年會, Fuzhou, China, 2018
- [P27] "基於光聲效應和波前整形的生物組織深層微米分辨率光學成像與刺激", 2018 粵港澳大灣區青年科學家微米納米技術協同創新論壇, Shenzhen, China, 2018
- [P28] "Temporal evolutionary single neuron optogenetics enabled by wavefront shaping – a pilot study", SPIE Photonics Asia, Beijing, China, 2018
- [P29] "High-resolution deep-tissue optical imaging enabled by photoacoustics and wavefront shaping", SPIE Photonics Asia, Beijing, China, 2018
- [P30] "Spatiotemporally evolutionary optogenetics enabled by wavefront shaping", 2018 年中國生物醫學工程聯合學術年會, Shenzhen, China, 2018
- [P31] "Shining new light into biological tissue: High-resolution optical imaging and stimulation at depths enabled by photoacoustics and wavefront shaping", 2018 年第十屆分子影像技術進展及應用研討會, Beijing, China, 2018
- [P32] "Deep-tissue optical imaging, focusing, and stimulation enabled by photoacoustics and wavefront shaping", The Federation of Asian societies for molecular imaging 2018, Xiamen, China, 2018
- [P33] "Synergy of light and sound for deep-tissue biomedical optical focusing and imaging", the 2018 Progress in Electromagnetics Research Symposium (PIERS 2018), Toyama, Japan, 2018
- [P34] "Ultrasound-mediated high-resolution optical focusing and imaging in optically scattering media", the 18th IEEE International Conference on Nanotechnology, Cork, Ireland, 2018

- [P35] "Guide-star assisted optical focusing and imaging at depths in tissue", the 10th International Conference on Information Optics and Photonics (CIOP), Beijing, China, 2018
- [P36] "Deep-tissue photoacoustic imaging enhanced by wavefront engineering and molecular probes", the 2nd International Conference on Digital Medicine, Guangzhou, Guangdong, 2018
- [P37] "Wavefront shaping-enhanced photoacoustic imaging", the International Conference on Biomedical Ultrasound (ICBMU), Hong Kong, China, 2017
- [P38] "Focused and controllable optical delivery in complex media using wavefront shaping", the 14th International Conference on Photonics and Imaging in Biology and Medicine (PIBM 2017), Suzhou, China, 2017
- [P39] "Reshaping light in deep tissue with ultrasonically guided optical focusing", the 1st International Conference on Optics, Photonics, and Materials, Nice, France, 2016
- [P40] "Wavefront Engineering-Enabled Optical Focusing at Depths in Scattering Media", Frontiers in Optical Bioimaging Technologies, University of Hong Kong, Hong Kong, 2016
- [P41] "Ultrasonically Guided Optical Focusing: Shining Focused Light into Deep Tissue", the 8th International Conference on Information Optics and Photonics, Shanghai, China, 2016
- [P42] "Focusing Light Deep in Tissue with Ultrasound Guidestars", in Optical Society of America (OSA) Frontiers in Optics & Laser Science 2015, San Jose, USA, 2015
- [P43] "Photoacoustically guided wavefront shaping (PAWS) for optical focusing beyond the diffusion limit in scattering media", College of Life Science and Technology, Huazhong University of Science and Technology, Wuhan, China, 2015
- [P44] "Ultrasound-guided optical wavefront control for focusing in scattering media," the Optical Society of America (OSA) Controlled Light Propagation through Complex Media Incubator, Washington DC, USA, 2014.

PART III SERVICE & PROFESSIONAL ACTIVITIES

University/Departmental Duties

- University Research Committee, Human Subjects Ethics Sub-committee (renamed to PolyU Institutional Review Board from November 2020), July 2019 — June 2024

- Deputy Leader of Department Taught Postgraduate Program, January 2021 —
- Department Research Seminar Coordinator, 2020 – 2021
- Department Management Committee (DMC), July 2019 — June 2021
- Department Health, Safety and Environmental Committee, July 2019 — June 2020
- Department Coordinator for Shenzhen Base and Mainland China Opportunity, July 2019 —
- Department Research Committee (DRC), July 2018 —
- Department Enrollment Liaison Officer for Chinese Mainland (JEE) Admission, July 2018 —

Membership

- The Optical Society of America (OSA)
- The International Society for Optics and Photonics (SPIE)
- Institute of Electrical and Electronics Engineers (IEEE)
- World Association for Chinese Biomedical Engineers (WACBE), Lifetime member
- Chinese Society of Biomedical Engineering (CSBME), Senior member
- Chinese Optical Society (COS), Senior member

Board Member

- 海峽兩岸醫藥衛生交流協會超聲醫學分會，委員， since 2021
- 中國光學學會生物醫學光子學分會，常委， since 2021
- 廣東省高層次人才評審專家庫，專家， since 2021
- 中國超聲醫學工程學會儀器工程開發專委會，委員， since 2021
- 深圳市科技創新委員會 2020 年新冠應急防治專項第二批專案第二輪答辯評審會，主審, 2020
- 廣州市科技專家庫第一批港澳籍專家， since 2020
- 廣東省基礎與應用基礎研究基金委員會第一屆學科諮詢專家組(醫學組)專家， since 2020
- 深圳市科技創新委員會 2020 年新型冠狀病毒感染應急防治并專項自由申報項目遠程答辯評審會，主審, 2020
- 中國生物醫學工程學會,生物醫學光子學分會,委員, since 2019
- 人民衛生出版社重點項目《數字化肝膽外科學》，編委, 2019
- 深圳市科技創新委員會，孔雀團隊/重點技術攻關項目答辯(醫療儀器組)，評審， since 2018

Journal Editorship

- Associate Editor, Journal of Visual Computing for Industry, Biomedicine, and Art (VCIBA) (under Springer), since 2019.

- Editor, Journal of Innovative Optics in Health and Science (JIOHS; SCI indexed), since 2018.
- Session Editor, Medicine in Novel Technology and Devices (MEDNTD), since 2020.
- Guest editor, Photonics, since 2021
- Guest editor, Frontiers in Photonics, since 2020

Proposal reviewer

- National Natural Science Foundation of China (NSFC), 2018-2020
- European Science Foundation (ESF) College of Expert Reviewers, 2020
- Proposal reviewer for European Science Foundation, 2019
- Proposal reviewer for US-Israel Binational Science Foundation, 2018
- Proposal reviewer for NWO (Netherlands Organization for Scientific Research), 2017

Journal Reviewer (alphabetically):

- ACS Photonics
- ACS Sensor
- Analyst
- Applied Optics
- Applied Physics Express
- Applied Physics Letters
- APL Photonics
- Applied Sciences
- Biomedical Optics Express
- Chinese Journal of Acoustics
- Chinese Optics Letters
- Frontiers of Optoelectronics
- IEEE Transactions on Biomedical Engineering (TBME)
- IEEE Journal of Selected Topics in Quantum Electronics (JSTQE)
- IEEE Photonics Journal
- IEEE Transactions on Medical Imaging (TMI)
- Journal of Acoustical Society of America (JASA)
- Journal of Applied Physics
- Journal of Biomedical Optics (JBO)
- Journal of Innovative Optical Health Sciences (JIOHS)
- Journal of Optical Engineering
- Journal of the Optical Society of America A (JOSA A)
- Journal of Physics D: Applied Physics
- Light: Science and Applications
- Measurement Science and Technology
- Optica
- Optics and Lasers in Engineering

- Optics Express
- Optics Letters
- Opto-Electronic Advances
- OSA Continuum
- Photoacoustics
- Photonics
- Physica Scripta
- Physics in Medicine and Biology
- Review of Scientific Instruments (RSI)
- Sensors
- Scientific Reports
- Ultrasonics
- Ultrasound in Medicine and Biology (UMB)
- Visual Computing for Industry, Biomedicine, and Art (VCIBA)