Curriculum Vitae

Jaena Park

Education

Doctor of Philosophy in Bioengineering — Aug. 2018 – May. 2025
University of Illinois Urbana-Champaign — Illinois, USA

- Thesis: Label-free optical signatures of extracellular vesicles and their applications in disease diagnosis and therapy response
- Advisor: Stephen A. Boppart
- Total of 3.71 / 4.0

Master of Engineering in Bio-convergence Engineering — Mar. 2015 – Aug. 2016
Korea University — Seoul, Korea

- Thesis: Exosome classification for cancer diagnosis by pattern recognition of Raman spectra
- Advisor: Yeonho Choi
- Total of 4.32 / 4.5 (97.9 / 100)

Bachelor of Engineering in Biomedical Engineering — Mar. 2011 – Feb. 2015
Korea University — Seoul, Korea

- Total of 4.0 / 4.5 (94.3 / 100)

Publications

Google scholar profile
https://scholar.google.com/citations?user=3xhoIXQAAAAJ&hl=en3

Published peer reviewed articles

Jaena Park and Edita Aksamitiene, Marina Marjanovic, Stephen A. Boppart. "Defining biological variability, analytical precision and quantitative biophysiochemical characterization of human urinary extracellular vesicles" Journal of extracellular vesicles (2025) DOI: 10.1002/jev2.70087 ***(Co-first Author)***

Jaena Park and Janet E. Sorrells, Edita Aksamitiene, Marina Marjanovic, Elisabeth M. Martin, Eric J. Chaney, Anna M. Higham, Kimberly A. Cradock, Zheng G. Liu, and Stephen A. Boppart. "Label-free nonlinear optical signatures of extracellular vesicles in liquid and tissue biopsies of human breast cancer." Scientific reports 14, no. 1 (2024): 5528. ***(Co-first Author)***

Jaena Park and Janet E. Sorrells, Eric J. Chaney, Amro M. Abdelrahman, Jennifer A. Yonkus, Jennifer L. Leiting, Heidi Nelson et al. "In vivo label-free optical signatures of chemotherapy response in human pancreatic ductal adenocarcinoma patient-derived xenografts." Communications biology 6, no. 1 (2023): 980. ***(Co-first Author)***

Jaena Park, Rebecca L Kamerer, Marina Marjanovic, Janet E Sorrells, Sixian You, Ronit Barkalifa, Kimberly A Selting, and Stephen A Boppart. "Label-free optical redox ratio from urinary extracellular vesicles as a screening biomarker for bladder cancer." American Journal of Cancer Research 12, no. 5 (2021): 2068-2083 ***(First Author)***

Curriculum Vitae

Jaena Park, Haohua Tu, Marina Marjanovic, and Stephen A. Boppart. “Label-Free Multimodal Multiphoton Intravital Imaging.” In Optical Imaging in Human Disease and Biological Research (2021): 127-146 ***(First Author)***

Jaena Park, Miyeon Hwang et al. “Exosome Classification by Pattern Analysis of Surface-enhanced Raman Spectroscopy Data for Lung Cancer Diagnosis.” Analytical Chemistry (2017). ***(First Author)***

Jaena Park, and Yeonho Choi. “Exosome identification for personalized diagnosis and therapy.” Biomedical Engineering Letters (2014). ***(First Author)***

De La Cadena, Alejandro, Jaena Park, Jindou Shi, Stephen A. Boppart. “On the importance of simultaneous label-free multimodal nonlinear optical imaging for biomedical applications.” APL Photonics 10, 110902 (2025)

Renteria, Carlos A., Jaena Park, Chi Zhang, Janet E. Sorrells, Rishyashring R. Iyer, Kayvan F. Tehrani, Alejandro De la Cadena, and Stephen A. Boppart. “Large field-of-view metabolic profiling of murine brain tissue following morphine incubation using label-free multiphoton microscopy.” Journal of Neuroscience Methods 408 (2024): 110171.

Das Gupta, Anasuya, Jaena Park, Janet E. Sorrells, Hannah Kim, Natalia Krawczynska, Dhanya Pradeep, Yu Wang et al. "27-Hydroxycholesterol Enhances Secretion of Extracellular Vesicles by ROS-Induced Dysregulation of Lysosomes." Endocrinology 165, no. 11 (2024): bqae127.

De la Cadena, Alejandro, Jaena Park, Kayvan F. Tehrani, Carlos A. Renteria, Guillermo L. Monroy, and Stephen A. Boppart. "Simultaneous label-free autofluorescence multi-harmonic microscopy driven by the supercontinuum generated from a bulk nonlinear crystal." Biomedical Optics Express 15, no. 2 (2024): 491-505.

Wang, Geng, Rishyashring R. Iyer, Janet E. Sorrells, Edita Aksamitiene, Eric J. Chaney, Carlos A. Renteria, Jaena Park et al. "Pixelation with Concentration-Encoded Effective Photons for Quantitative Molecular Optical Sectioning Microscopy." Laser & Photonics Reviews 18, no. 10 (2024): 2400031.

Gupta, Anasuya Das, Natalia Krawczynska, Hashni Epa Vidana Gamage, Hannah Kim, Jaena Park, Janet E. Sorrells, Stephen A. Boppart, and Erik R. Nelson. "27-Hydroxycholesterol impairs lysosomal integrity in myeloid immune cells, resulting in enhanced secretion of cancer promoting extracellular vesicles." Cancer Research 83, no. 7_Supplement (2023): 1258-1258.

Shi, Jindou, Haohua Tu, Jaena Park, et al. “Weakly supervised identification of microscopic human breast cancer-related optical signatures from normal-appearing breast tissue.” Biomedical Optics Express 14, no. 4 (2023): 1339-1354.

Tehrani, Kayvan Forouhesh, Jaena Park, Eric J. Chaney, Haohua Tu, and Stephen A. Boppart. "Nonlinear Imaging Histopathology: A Pipeline to Correlate Gold-Standard

Curriculum Vitae

Hematoxylin and Eosin Staining With Modern Nonlinear Microscopy." IEEE Journal of Selected Topics in Quantum Electronics 29, no. 4: Biophotonics (2023): 1-8.

Lyer, Rishyashring R., Carlos A. Renteria, Lingxiao Yang, Janet E. Sorrells, Jaena Park, Liang Sun, Zhengxin Yu, Yiran Huang, Marina Marjanovic, Liviu M. Mirica, Stephen A. Boppart. "Tracking the binding of multi-functional fluorescent tags for Alzheimer's disease using quantitative multiphoton microscopy." Journal of Biophotonics e3021 (2022)

Yang, Lingxiao, Jaena Park, Eric J. Chaney, Janet E. Sorrells, Marina Marjanovic, Heidi Phillips, Darold R. Spillman, and Stephen A. Boppart. "Label-free multimodal nonlinear optical imaging of needle biopsy cores for intraoperative cancer diagnosis." Journal of Biomedical Optics 27, no. 5 (2022): 056504.

Yang, Lingxiao, Jaena Park, Marina Marjanovic, Eric J. Chaney, Darold R. Spillman, Heidi Phillips, and Stephen A. Boppart. "Intraoperative label-free multimodal nonlinear optical imaging for point-of-procedure cancer diagnostics." IEEE Journal of Selected Topics in Quantum Electronics 27, no. 4 (2021): 1-12.

Baek, Amy E., Natalia Krawczynska, Anasuya Das Gupta, Svyatoslav Victorovich Dvoretskiy, Sixian You, Jaena Park, Yu-Heng Deng et al. "The Cholesterol Metabolite 27HC Increases Secretion of Extracellular Vesicles Which Promote Breast Cancer Progression." Endocrinology 162, no. 7 (2021): bqab095.

Žurauskas, Mantas, Aneesh Alex, Jaena Park, Steve R. Hood, and Stephen A. Boppart. "Fluorescent nanodiamonds for characterization of nonlinear microscopy systems." Photonics Research 9, no. 12 (2021): 2309-2318.

Jung, Jik-Han, Woojin Back, Junyong Yoon, Hyeonjeong Han, Ka-Won Kang, Byeonghyeon Choi, Hyesun Jeong, Jaena Park et al. "Dual size-exclusion chromatography for efficient isolation of extracellular vesicles from bone marrow derived human plasma." Scientific reports 11 (2021).

You, Sixian, Yi Sun, Lin Yang, Jaena Park, Haohua Tu, Marina Marjanovic, Saurabh Sinha, and Stephen A. Boppart. "Real-time intraoperative diagnosis by deep neural network driven multiphoton virtual histology." npj Precision Oncology 3, no. 1 (2019): 1-8.

You, Sixian, Ronit Barkalifa, Eric J. Chaney, Haohua Tu, Jaena Park, Janet Elise Sorrells, Yi Sun et al. "Label-free visualization and characterization of extracellular vesicles in breast cancer." Proceedings of the National Academy of Sciences 116, no. 48 (2019): 24012-24018.

Lim, Jae-young, Jung-soo Nam, Hyunku Shin, Jaena Park, Hye-in Song, Minsung Kang, Kwang-il Lim, and Yeoh Choi. "Identification of newly emerging influenza viruses by detecting the virally infected cells based on surface enhanced Raman spectroscopy and principal component analysis." Analytical chemistry 91, no. 9 (2019): 5677-5684.

Curriculum Vitae

	Lim, Jae-young, Jung-soo Nam, Hyunku Shin, Jaena Park, Hye-in Song, Minsung Kang, Kwang-il Lim, and Yeoh Choi. "Identification of Newly Emerging Influenza Viruses by Detecting the Virally Infected Cells Based on Surface Enhanced Raman Spectroscopy and Principal Component Analysis." Analytical chemistry 91, no. 9 (2019): 5677-5684. Shin, Hyunku, Hyesun Jeong, Jaena Park, Sunghoi Hong, and Yeonho Choi. "Correlation between cancerous exosomes and protein markers based on surface-enhanced Raman spectroscopy (SERS) and principal component analysis (PCA)." ACS sensors 3, no. 12 (2018): 2637-2643. DOI: 10.1021/acssensors.8b01047 Kang, Ka-Won, Jik-Han Jung, Woojune Hur, Jaena Park, Hyunku Shin, Byeonghyeon Choi, Hyesun Jeong et al. "The Potential of Exosomes Derived from Chronic Myelogenous Leukaemia Cells as a Biomarker." Anticancer research 38, no. 7 (2018): 3935-3942. DOI: 10.21873/anticanres.12679 **First-author manuscripts in preparation** Jaena Park, et al. "Label-free optical metabolic profiling of hypoxia-induced extracellular vesicles in breast and pancreatic cancer" Journal of extracellular vesicles (2025). ***(First Author, Under review at Journal of Extracellular Vesicles)*** Jaena Park, et al. "The impact of radiation on autofluorescence in canine transitional cell carcinoma cells and their extracellular vesicles" (2025). ***(First Author, in preparation)***
Presentation	**Poster presentation** Allen Frontiers Symposium 2025 Jaena Park, et al. "Extracellular vesicles in aging: optical characterization and functional impact" ISEV 2023 Annual Meeting Jaena Park, et al. "Optical biomarkers of radiation therapy in canine urinary extracellular vesicles characterized by label-free multimodal multiphoton microscopy" Gordon Research Conferences (GRC), 2024 Meeting of Extracellular Vesicles Jaena Park, et al. "Label-free imaging of metabolic signal alterations in extracellular vesicles post-radiotherapy in canine bladder cancer cells" ISEV Virtual Symposium on Urinary Extracellular Vesicles – uEV2022 Jaena Park, et al. "Label-free optical metabolite imaging signatures of urinary extracellular vesicles from dogs as a genitourinary cancer biomarker" SPIE ABC, 2021 Jaena Park, et al. "Label-free optical characterization and metabolite imaging of urinary extracellular vesicles from tumor-bearing and healthy dogs" OSA Biophotonics Congress: Biomedical Optics 2020

Curriculum Vitae

	Jaena Park, et al. "Characterizing treatment response of pancreatic tumor patient-derived xenografts in mice by Simultaneous Label-Free Autofluorescence Multi-Harmonic (SLAM) microscopy." In Clinical and Translational Biophotonics, pp. TM2B-4. Optical Society of America, 2020. **Oral presentation** SPIE BiOS, 2021 Jaena Park, et al. "Label-free multimodal nonlinear imaging of the treatment response in pancreatic tumor patient-derived xenografts in mice." In Label-free Biomedical Imaging and Sensing (LBIS) 2021, vol. 11655, p. 116550J. International Society for Optics and Photonics, 2021.
Patent	Jaena Park, and Yeonho Choi, "Method for classifying Raman signals of exosomes by pattern recognition and method for diagnosing cell." Patent Application Published WO 2017/175928 A1
Honors and Awards	SP 2025 BIOE Conference Presentation Award, 2025 University Block Grant Fellowship, 2024 Best Poster Prize, ISEV Virtual Symposium on Urinary Extracellular Vesicles, 2022 ASAN Graduate Student Scholarship, ASAN Foundation, 2019 – 2021 Fulbright Graduate Study Award, Principal Candidate, 2018 - 2019 Best Paper Award, International Biomedical Engineering Conference (IBEC), 2016 General Scholarship, Korea University, 2016 Combined Bachelor's and Master's Scholarship, Korea University, 2015 Graduation with Great Honor at Korea University, 2015 The KU Rock Foundation Scholarship, Korea University, 2014 Best Honors Scholarships, Korea University, 2014 Honors Scholarships, Korea University, 2011
Research Experience	**Biophotonics Imaging Laboratory** — Aug. 2018 – May. 2025 Research assistant *(Adviser: Professor Stephen Boppart)* — Illinois, USA Biomedical application of simultaneous label-free autofluorescence multiharmonic (SLAM) microscopy **Korea University** — Dec. 2014 – Mar. 2017 Research assistant *(Adviser : Professor Yeonho Choi)* — Seoul, Korea • Exosome mediated cancer detection method using plasmon effect **Nanobiophotonics Laboratory, Korea University** — Aug. 2013 – Nov. 2014 Research intern (*Adviser : Professor Yeonho Choi*)

Curriculum Vitae

Teaching Experience

Department of Mechanical & Aerospace Engineering — Aug. 2026 – Present
Instructor — Texas, USA
- ME2315 Computer-aided Analysis

Department of Bioengineering, University of Illinois at Urbana-Champaign — Aug. 2022 – May. 2024
Teaching Assistant — Illinois, USA
- BIOE303 Quantitative Physiology Lab

School of Biomedical Engineering, Korea University — Sep. 2015 – Feb. 2016
Teaching Assistant — Seoul, Korea
- BMED410 Biomedical Engineering Project

Department of Biomedical Engineering, Korea University — Mar. 2015 – Aug. 2015
Teaching Assistant — Seoul, Korea
- KHBE471 Seminar for Biomedical Engineers

Work Experience

Department of Physiology and Neurobiology Storrs — Aug. 2025 – Aug. 2026
Laboratory technician — Connecticut, USA
- PNB 2264/2265 Human Physiology and Anatomy
- PNB 2774/2775/2776 Enhanced Human Physiology and Anatomy

Korea University Hospital — Apr. 2017 – Jun. 2018
Researcher — Seoul, Korea
- Establishment of open research and business platform in developing new medical devices and their globalization
- Real-time Early Diagnostic Biochip for Exosome-based Cancer Detection

Skills

Biological Techniques
Mammalian Cell Culture (BSL-2) | Mouse Surgery | Western Blotting | Histology | Size Exclusion Chromatography | Ultracentrifugation

Microscopy & Optical Imaging
Multimodal Imaging | Timelapse Imaging | Autofluorescence Imaging | Nonlinear Optical Microscopy | Multiphoton Imaging | Raman Spectroscopy | Two-photon Microscopy | Three-photon Microscopy | Immunofluorescent Microscopy | Nanoparticle Tracking Analysis | Dynamic Light Scattering | Transmission/Scanning Electron Microscopy | Atomic Force Microscopy | Fiber Optics | *in vivo* & *ex vivo* Imaging

Programming & Data Analysis

Curriculum Vitae

	MATLAB | Python | R/RStudio | SAS | GraphPad Prism | FIJI (ImageJ) | LabVIEW | LaTeX | Git | Microsoft Office Suite | Adobe Creative Suite **Engineering & Fabrication** Nanoparticle-based Substrates | Plasmon Substrate Manufacturing (SERS) | Microfluidic Chip Fabrication | Rhinoceros | KeyShot **Scientific Competencies** Science Communication and Writing | Experimental Design & Troubleshooting | Statistical Analysis | Data Management | Protocol Development | Laboratory Record-Keeping | Mentoring and Training