



SPIE ABC 2025

SPIE Advanced Biophotonics Conference 2025

October 29 - November 1, 2025 | Sono Belle Jeju, Jeju, Korea

PROGRAM BOOK

Hosted by



Organized by

SPIE ABC 2025
COMMITTEE

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WELCOME MESSAGE

On behalf of the organizing committee, it is my great pleasure to welcome you to the SPIE Advanced Biophotonics Conference 2025 (SPIE ABC 2025), to be held October 29 – 1 November 2025 at Sono Bell Jeju, located on the pristine shores of Hamdeok Beach, one of Jeju Island's most scenic and iconic destinations.

SPIE ABC 2025 serves as a premier international forum for the biophotonics community, bringing together more than 250 leading scientists, engineers, and clinicians from around the world. The conference covers a broad spectrum of topics—from molecular-level optical techniques to tissue and organ imaging, biophotonic instrumentation, and advanced optical biosensors—reflecting the rapidly growing and interdisciplinary nature of the field.

The technical program will feature invited presentations from world-renowned experts, contributed oral and poster sessions, and ample opportunities for in-depth discussion and collaboration. In addition to the scientific sessions, participants will enjoy social events and local excursions designed to foster networking and showcase the cultural richness of Jeju Island.

We look forward to welcoming you to Jeju for a vibrant and engaging conference that promises to advance the frontiers of biophotonics and inspire new directions in research and innovation.

Sincerely,



Ki-Hun Jeong

Conference Chair

SPIE Advanced Biophotonics Conference 2025



COMMITTEE

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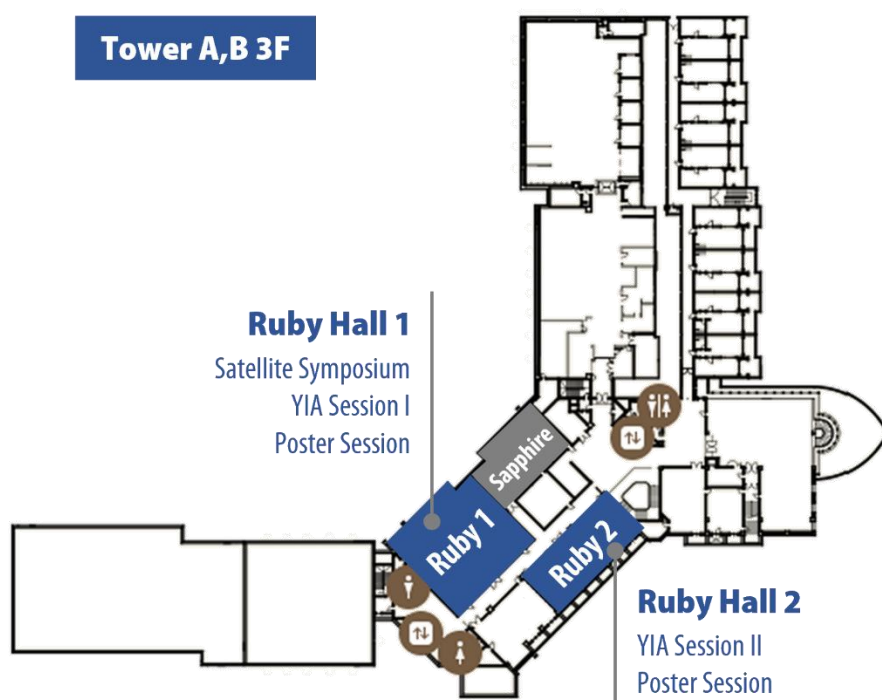
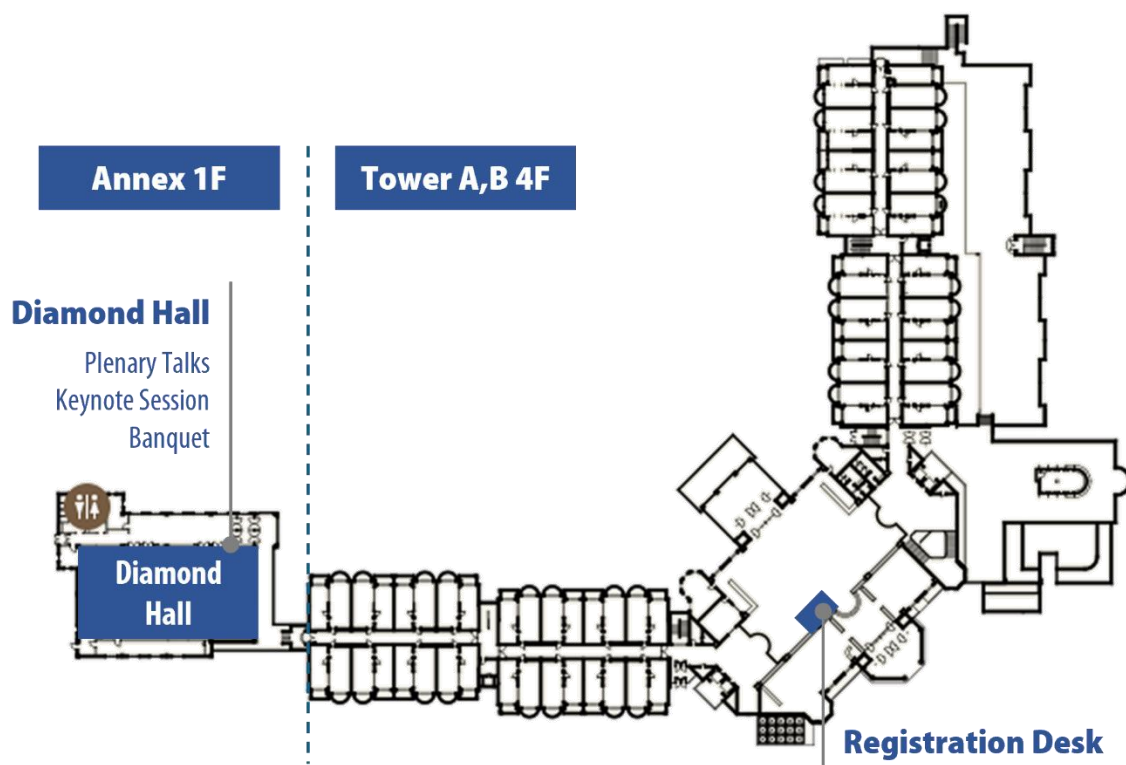
PROGRAM AT A GLANCE

October 29 (Wed.)			
Time / Room	Room A (Diamond Hall, Annex 1F)	Room B (Ruby 1, 3F)	Room C (Ruby 2, 3F)
09:30 - 12:45		Satellite Symposium: 2025 Global Symposium for Neurotechnology in Surgery	
13:00 - 17:30	Satellite Symposium: OSK-CSOE Joint Symposium		
16:00~17:45		Young Investigator's Award Session I	Young Investigator's Award Session II
October 30 (Thu.)			
Time / Room	Room A (Diamond Hall, Annex 1F)		
08:30~09:00	Registration		
09:00~09:20	Opening Ceremony		
09:20~10:10	Plenary Talk I: Photoacoustic, Light-Speed, and Quantum Imaging		
10:10~10:30	Coffee Break		
10:30~12:00	Keynote Session I: Clinical & Translational Biophotonics		
12:00~13:00	Lunch		
13:00~14:30	Keynote Session II: Neurophotonics		
14:30~15:00	Break		
15:00~16:30	Keynote Session III: Optical Tomography and Tissue Optics		
16:30~17:00	Coffee Break		
17:00~18:30	Keynote Session IV: Neurophotonics		
18:30~20:30	Poster Session I [Room B & Room C (Ruby 1 & Ruby 2, 3F)] 01. Molecular and Cellular Imaging / 02. Clinical & Translational Biophotonics / 03. Optical Tomography and Tissue Optics / 05. Neurophotonics		
October 31 (Fri.)			
Time / Room	Room A (Diamond Hall, Annex 1F)		
08:30~09:00	Registration		
09:00~10:30	Keynote Session V: Nanobiophotonics		
10:30~11:00	Coffee Break		
11:00~12:30	Keynote Session VI: Biophotonic Enabling Technologies		
12:30~13:30	Lunch		
13:30~14:20	Plenary Talk II: Mesoscale Intravital Fluorescence Microscopy: A Decades-Long Journey from Concept to Innovation		
14:20~14:40	Break		
14:40~16:10	Keynote Session VII: Computational Optics and AI		
16:10~16:30	Coffee Break		
16:30~18:30	Poster Session II [Room B & Room C (Ruby 1 & Ruby 2, 3F)] 04. Nanobiophotonics / 06. Computational Optics and AI / 07. Biophotonic Enabling Technologies		
18:30~20:30	Banquet		
November 1 (Sat.)			
Time / Room	Diamond Hall (Location: UTOP UBLESS Hotel)		
09:00~10:00	Tutorial I: Beginner's Guide to Drawing a Photonical Figures/Illustration for Journal Paper/Project Using 3D Rhino		
10:00~10:30	Coffee Break		
10:30~11:30	Tutorial II: Light Sheet Fluorescence Microscopy		



FLOOR PLAN

Sono Bell Jeju



GENERAL INFORMATION

REGISTRATION

Registration desk will be open from October 29 to 31 in the lobby(4F) of Sono Belle Jeu. On-site payments can be made by credit card (Visa, MasterCard, or AMEX) or cash (USD and KRW only). The registration desk will be open during the conference according to the following schedule.

Place	Date	Time
Lobby(4F), Sono Belle Jeu	October 29 (Wed.)	08:00 – 18:00
	October 30 (Thu.)	08:00 – 18:00
	October 31 (Sun.)	08:00 – 17:00

NAME BADGE

Name badge will be used as admission passes. You are kindly requested to wear your name badges throughout the conference period. Please note that access to the session rooms and exhibition area may be restricted if you are not wearing your name badge.

LUNCHES

Lunch will be provided for all SPIE ABC 2025 registrants in Four Seasons restaurant (Tower A, 2F) on October 30 and 31.

Place	Date	Time
Four Seasons	October 30 (Thu.)	12:00 – 13:00
	October 31 (Fri.)	12:30 – 13:30

COFFEE BREAKS

Fresh coffee will be served during coffee breaks at the following times.

Place	Date	Time
Lobby, Rubby I, 3F & Lobby, Diamond Hall, Annex 1F	October 29 (Wed.)	Available throughout the day
Lobby, Diamond Hall, Annex 1F	October 30 (Thu.)	10:10 – 10:30 / 16:30 – 17:00
Lobby, Diamond Hall, Annex 1F	October 31 (Fri.)	10:30 – 11:00 / 16:10 – 16:30
Diamond Hall, UTOP UBLESS Hotel	November 1 (Sat.)	10:00 – 10:30

WI-FI (Wireless Internet)

Free public wireless internet is available for all participants within the venue.

LOST AND FOUND

Please visit the registration desk (Lobby, 4F) for any lost and found items.



PROGRAM_OCTOBER 29 (WED.)
[Satellite Symposium] 2025 Global Symposium for Neurotechnology in Surgery

Room B [Ruby I, Tower A (3F)]

October 29 (Wed.) / 09:30~12:45

- 09:30~09:40 **[Opening Remark]**
 Woonggyu Jung
Ulsan National Institute of Science and Technology, Korea
- [Invited]** 09:40~10:00 **Multimodal monitoring during the Microscopic Neurosurgical Operation**
 Jung-Jae Kim
Yonsei University Health System (YUHS), Korea
- [Invited]** 10:00~10:20 **Advanced Optical Imaging Techniques for Visualizing Neuronal Activity in Zebrafish Brain**
 Eunjung Min
Korea Photonics Technology Institute, Korea
- [Invited]** 10:20~10:40 **Somatic Mutation Profiling of Clonal Hematopoiesis of Indeterminate Potential (CHIP) in Alzheimer's Disease**
 Jaejoon Choi
Ulsan National Institute of Science and Technology, Korea
- 11:00~11:15 **Versatile Digital Histopathology Platform Applied with NIR-QPI and Deep Learning Algorithm**
 Hyewon Cho
Ulsan National Institute of Science and Technology, Korea
- 11:15~11:30 **Optical Coherence Tomography-Integrated Surgical Microscope**
 Myungju Kim
Ulsan National Institute of Science and Technology, Korea
- 11:30~11:45 **Portable QPI for Label-Free Rapid On-Site Evaluation (ROSE)**
 Myeonghoon Choi
Ulsan National Institute of Science and Technology, Korea
- 11:45~12:00 **In vivo Visualization with Surgical OCT through a Spinal Cord Window**
 Sunyeong Choi
Ulsan National Institute of Science and Technology, Korea
- 12:00~12:15 **A 1024-Channel ECoG Mapping of Brain Tumors in a Rat Model**
 Junseong Kim
Ulsan National Institute of Science and Technology, Korea
- 12:15~12:30 **An Optogenetic Dissection of the Brain-Gut Axis; Cortical Signatures of Neuropathic Pain**
 Changjun Lee
Ulsan National Institute of Science and Technology, Korea
- 12:30~12:45 **Neuron Integrated Biohybrid Neural probes**
 YeongSeokYe
Ulsan National Institute of Science and Technology, Korea



[Satellite Symposium] OSK-CSOE Joint Symposium I

Room A [Diamond Hall, Annex (1F)]

October 29 (Wed.) / 13:00~14:00

Chair: Byullee Park (Sungkyunkwan University, Korea)

- [Invited]** **Multispectral Quantitative Optoacoustic Imaging and Sensing for Tissue Optics**
 13:00~13:15
 Jiao Li
Tianjin University, China
- [Invited]** **Diffusion-Based Deep Learning Enhances 3D Multiparametric Photoacoustic Computed Tomography**
 13:15~13:30
 Hyunsu Jeong
Pohang University of Science and Technology, Korea
- [Invited]** **Dynamic Optical Coherence Tomography for Label-Free Imaging of Cell Viability and its Application in Drug Screening**
 13:30~13:45
 Jianbo Tang
Southern University of Science and Technology of China, China
- [Invited]** **Multimodal Optoacoustic Functional Neuroimaging**
 13:45~14:00
 Zhenyue Chen
Tongji University, China

[Satellite Symposium] OSK-CSOE Joint Symposium II

Room A [Diamond Hall, Annex (1F)]

October 29 (Wed.) / 14:15~15:45

Chair: Chulhong Kim (Pohang University of Science and Technology, Korea)

- [Keynote]** **Quantitative and Holistic Superresolution Live-cell Imaging: From Structured Illumination Microscopy to the Sparse Deconvolution**
 14:15~14:45
 Liangyi Chen
Peking University, China
- [Invited]** **Advancing Biomedical Imaging with Wavelength-Tunable Light Source**
 14:45~15:05
 Hwidon Lee
Pusan National University, Korea
- [Invited]** **Seeing More with Opto-Acoustic Hybrid Imaging**
 15:05~15:25
 Chengbo Liu
Shenzhen Institute Advanced Technology, China
- [Invited]** **Label-free Photoacoustic Imaging of 3D In Vitro Organoids and Ex Vivo Human Tissue Slices**
 15:25~15:45
 Byullee Park
Sungkyunkwan University, Korea

[Satellite Symposium] OSK-CSOE Joint Symposium III

Room A [Diamond Hall, Annex (1F)]

October 29 (Wed.) / 16:00~17:30

Chair: Chulhong Kim (Pohang University of Science and Technology, Korea)

- [Keynote]** **Label-Free Multimodal Optical Imaging of Tissue Structure and Function for Clinical Translation**
 16:00~16:30
 Hongki Yoo
Korea Advanced Institute of Science and Technology, Korea
- [Invited]** **Multimodal Imaging via Transparent Ultrasound Transducers**
 16:30~16:50
 Chulhong Kim
Pohang University of Science and Technology, Korea
- [Invited]** **Mechanistic Origins of Photothermal Response in Au Multi-nanorings**
 16:50~17:10
 TaeyeonKim
Sungkyunkwan University, Korea
- [Invited]** **Photoacoustic Microscopy of Brain Functions**
 17:10~17:30
 Lei Xi
Southern University of Science and Technology, China



Young Investigator's Award Session I

Room B [Ruby I, Tower A (3F)]

October 29 (Wed.) / 16:00~17:45

Chair: Jeesu Kim (Pusan National University)

- [YIA1-1]** 16:00~16:15 **Development of Multipath Artifact-Reduction Collimator to Enhance Signal-to-Noise Ratio in Double-Clad Fiber-Based Intravascular Optical Coherence Tomography**
 Youngeun Cho¹, Jeongmoo Han¹, Yeon Hoon Kim¹, Hyeong Soo Nam¹, Min Woo Lee², Young-Jin Kim¹, Jin Won Kim³, and Hongki Yoo¹
¹Korea Advanced Institute of Science and Technology, Korea, ²Dotter Inc., Korea, ³Korea University Guro Hospital, Korea
- [YIA1-2]** 16:15~16:30 **Pupil Phase Series: A Fast, Accurate, and Energy-Conserving Model for Forward and Inverse Light Scattering in Thick Biological Samples**
 Herve Hugonnet¹, Chulmin Oh¹, Juyeon Park¹, and YongKeun Park^{1,2}
¹Korea Advanced Institute of Science and Technology, Korea, ²Tomocube Inc., Korea
- [YIA1-3]** 16:30~16:45 **Intracellular Refractive Index Imaging via Plasmonic Metasurfaces**
 Doeun Kim, Jiyeong Ma, Gyurin, Kim, JuHyeong Lee, and Hyeon-Ho Jeong
 Gwangju Institute of Science and Technology, Korea
- [YIA1-4]** 16:45~17:00 **Correlative Expansion Imaging-driven Deep Learning to Enable High-throughput in Vivo Super-resolution Microscopy**
 Young Seo Kim, Yunseo Lee, and Taeyun Ku
 Korea Advanced Institute of Science and Technology, Korea
- [YIA1-5]** 17:00~17:15 **Diffusion-Based Deep Learning Enhances 3D Multiparametric Photoacoustic Computed Tomography**
 Hyunsu Jeong¹, Seunghun Oh¹, Seongwook Choi², Jiwoong Kim¹, Jinge Yang³, and Chulhong Kim¹
¹Pohang University of Science and Technology, Korea, ²Stanford University, USA, ³California Institute of Technology, USA
- [YIA1-6]** 17:15~17:30 **Pupil Plane Multiplexed Fourier Ptychography for Polarization Sensitive Imaging**
 Hyesuk Chae¹, Kyungwon Lee¹, Yong Guk Kang², Hansol Yoon^{1,3}, Kyung Chul Lee², and Seung Ah Lee²
¹Yonsei University, Korea, ²Seoul National University, Korea, ³Georgia Institute of Technology, USA
- [YIA1-7]** 17:30~17:45 **Wireless Optogenetic Deep Brain Stimulation Implant for Chronic Treatment of Parkinson's Disease**
 Choong Yeon Kim¹, Gun-Hee Lee², Steve Park¹, Daesoo Kim¹, and Jae-Woong Jeong¹
¹Korea Advanced Institute of Science and Technology, Korea, ²Pusan National University, Korea

Young Investigator's Award Session II

Room C [Ruby II, Tower A (3F)]

October 29 (Wed.) / 16:00~17:45

Chair: ByungKun Lee (Daegu Gyeongbuk Institute of Science and Technology)

- [YIA2-1]** 16:00~16:15 **Label-free Morpho-molecular Live-cell Phenotyping Propels Biological Discovery**
 Arianna Bresci¹, Salvatore Sorrentino¹, Renzo Vanna², Dario Polli², Peter T. C. So¹, and Jeon Woong Kang¹
¹Massachusetts Institute of Technology, USA, ²Politecnico di Milano, Italy
- [YIA2-2]** 16:15~16:30 **Early and Accurate Automated Identification Platform of Pathogenic Bacterial Species Using Optical Coherence Microscopy and Ensemble Deep-learning Network**
 Daewoon Seong, Euimin Lee, Seung-Yeol Lee, Hee-Young Jung, Mansik Jeon, and Jeehyun Kim
 Kyungpook National University, Korea
- [YIA2-3]** 16:30~16:45 **Chromatic Optical Coherence Tomography for Clear Deep Tissue Imaging**
 Seung Eon Lee¹, Hyeong Soo Nam¹, Ryeong Hyeon Kim², Hyun Jung Kim², Jae Yeon Seok³, Jin Won Kim², Young-Jin Kim¹, and Hongki Yoo¹
¹Korea Advanced Institute of Science and Technology, Korea, ²Korea University Guro Hospital, Korea, ³Yonsei University College of Medicine, Korea
- [YIA2-4]** 16:45~17:00 **Event-based Imaging of Neuronal and Vascular Dynamics in Vivo**
 Jongmin Yoon^{1,2}, Soi Kim³, Seungjae Han³, Euiheon Chung⁴, Kunyoo Shin^{1,2}, Young-Gyu Yoon³, and Myunghwan Choi^{1,2}
¹Seoul National University, Korea, ²The Institute of Molecular Biology and Genetics, Korea, ³Korea Advanced Institute of Science and Technology, Korea, ⁴Gwangju Institute of Science and Technology, Korea



[YIA2-5] Adaptive Optics based on Neural Wavefront Shaping for Two-photon Microscopy

17:00~17:15

Hyungwon Jin, Seongwon Cho, Jaejun Yoo, and Jung-Hoon Park

*Ulsan National Institute of Science and Technology, Korea***[YIA2-6] Diffusion Model for Forward Model Uncertainty in Computational Imaging**

17:15~17:30

Chanseok Lee and Mooseok Jang

*Korea Advanced Institute of Science and Technology, Korea***[YIA2-7] Quasi-Ordered Plasmonic Metasurfaces for Optical Security**

17:30~17:45

Gyurin Kim, Doeun Kim, JuHyeong Lee, Young Min Song, and Hyeon-Ho Jeong

Gwangju Institute of Science and Technology, Korea

PROGRAM_ OCTOBER 30 (THU.)

Plenary Talk I

Room A [Diamond Hall, Annex (1F)] *Online Presentation

October 30 (Thu.) / 09:20 – 10:10

Chair: Tae Joong Eom (Pusan National University)


Lihong Wang

California Institute of Technology, USA

Lihong Wang is Bren Professor of Medical and Electrical Engineering at Caltech. Published 615 journal articles (h-index = 165, citations = 117K, #1 most cited in optics according to Stanford/Elsevier). Delivered 630 keynote/plenary/invited talks. Published the first functional photoacoustic CT, 3D photoacoustic microscopy, and light-speed compressed ultrafast photography (the world's fastest camera). Served as Editor-in-Chief of the Journal of Biomedical Optics. Received Goodman Book Award; NIH Outstanding Investigator, NIH Director's Transformative

Research, and NIH Director's Pioneer Awards; Optica Mees Medal and Feld Award; IEEE Technical Achievement and Biomedical Engineering Awards; SPIE Chance Award; IPPA Senior Prize; honorary doctorate from Lund University, Sweden. Inducted into the National Academy of Engineering.

Photoacoustic, Light-Speed, and Quantum Imaging

We have developed photoacoustic tomography (PAT) for deep-tissue imaging, offering in vivo functional, metabolic, molecular, and histologic imaging from organelles to entire organisms. Additionally, we developed light-speed compressed ultrafast photography (CUP), capable of recording at 219 trillion frames per second. CUP can capture the fastest phenomena, such as light propagation, and can also slow down to record events like neural conduction. Further, our research extends to quantum entanglement for imaging.

PAT combines optical and ultrasonic waves, overcoming the optical diffusion limit (~ 1 mm) with centimeter-scale deep penetration, high ultrasonic resolution, and optical contrast. Applications include early cancer detection and brain imaging. The annual PAT conference, a part of SPIE's Photonics West, has been a significant event since 2010.

CUP, with a single exposure, captures transient events on a femtosecond scale. Unlike other ultrafast imagers requiring active illumination, CUP is receive-only and can be paired with various front optics, from microscopes to telescopes, facilitating diverse applications in fundamental and applied sciences, including biology and cosmophysics.

Quantum imaging utilizing Heisenberg scaling enhances spatial resolution linearly with the number of quanta, outperforming the standard quantum scaling's square-root improvement.



Keynote Session I: Clinical & Translational Biophotonics

Room A [Diamond Hall, Annex (1F)]

October 30 (Thu.) / 10:30~12:00

Chairs: Tae Joong Eom (Pusan National University) and Woo June Choi (Chung-Ang University)

[Keynote 1-1] Monitoring Circulating Melanoma Cells by in Vivo Photoacoustic Flow Cytometry

10:30~11:00

*Online

Xunbin Wei

Peking University, China

[Keynote 1-2] Optical Coherence Tomography Angiography and Its Biomedical Applications

11:00~11:30

Ruikang K. Wang

University of Washington, USA

[Keynote 1-3] Compact Band-pass Raman Spectroscopy for Non-invasive Continuous Glucose Monitoring

11:30~12:00

Jeon Woong Kang

Massachusetts Institute of Technology, USA

Keynote Session II: Molecular and Cellular Imaging

Room A [Diamond Hall, Annex (1F)]

October 30 (Thu.) / 13:00~14:30

Chairs: Jeongmin Kim (Seoul National University) and Dong-Ryoung Lee (Soongsil University)

[Keynote 2-1] Polar-SIM: Super-resolution Structured Illumination Microscopy in XYZλθT Dimensions

13:00~13:30

 Peng Xi^{1,2}
¹Peking University, China, ²Airy Technologies Co., Ltd., China

[Keynote 2-2] Light-sheet Fluorescence Microscopy with High Spatiotemporal Resolution

13:30~14:00

Bingying Chen, Bo-Jui Chang, and Reto Fiolka

UT Southwestern Medical Center, USA

[Keynote 2-3] Elucidating Subcellular Architecture and Dynamics with Super-resolution Microscopy

14:00~14:30

Yongdeng Zhang

Westlake University, China

Keynote Session III: Optical Tomography and Tissue Optics

Room A [Diamond Hall, Annex (1F)]

October 30 (Thu.) / 15:00~16:30

Chairs: Jonghee Yoon (Ajou University) and Byullee Park (Sungkyunkwan University)

[Keynote 3-1] High-speed Optical Tomographic Imaging with the Wavelength-swept HCG-VCSEL Technology

15:00~15:30

Hsiang-Chieh Lee

National Taiwan University, Taiwan

[Keynote 3-2] Seeing More with Opto-Acoustic Hybrid Imaging

15:30~16:00

Chengbo Liu

Chinese Academy of Sciences, China

[Keynote 3-3] Behind the Seen: When Microscopes Capture Data, Not Images

16:00~16:30

Nicolas Christian Richard Pegard

University of North Carolina, USA


Keynote Session IV: Neurophotonics

Room A [Diamond Hall, Annex (1F)]

October 30 (Thu.) / 17:00~18:30

Chairs: Myunghwan Choi (Seoul National University) and Young-Gyu Yoon (Korea Advanced Institute of Science and Technology)**[Keynote 4-1] Optical Electrophysiology Reveals Associative Plasticity Rules**

17:00~17:30

Pojeong Park^{1,4}, J. David Wong-Campos¹, Daniel G. Itkis¹, Byung Hun Lee¹, Yitong Qi¹, Liam Paninski², Luke D. Lavis³, Adam E. Cohen¹¹Harvard University, USA, ²Columbia University, USA, ³Howard Hughes Medical Institute, USA, ⁴Daegu Gyeongbuk Institute of Science and Technology, Korea**[Keynote 4-2] Toward Petabyte-scale Microscopy - from Brain Imaging to Imaging Cytometry**

17:30~18:00

Kevin Tsia

Hong Kong University, Hong Kong

[Keynote 4-3] Imaging the Brain at Higher Spatial and Temporal Resolutions

18:00~18:30

Lu Bai, Yujie Zhang, and Kai Wang

Chinese Academy of Sciences, China



Poster Session I

Ruby I & II, Tower A (3F)
October 30 (Thu.) / 18:30~20:00

- [P1-01] Comparative Characterization of Grating-based Imaging Spectrometers for Spectroscopic Nanoscopy**
 Ki-Hee Song
Korea Atomic Energy Research Institute, Korea
- [P1-02] Label-Free 3D Live Imaging of Lipid Droplets in Hepatic Organoids**
 Jimin Cho¹, Hye-Jin Kim², Hoyeon Lee², YongKeun Park^{1,2}
¹Korea Advanced Institute of Science and Technology, Korea, ²Tomocube Inc., Korea
- [P1-03] Long-term Subcellular Intravital Imaging of eSRRF based Two-photon Microscopy**
 Saeed Bohlooli Darian¹, Jeongmin Oh², and Jun Ki Kim^{1,2}
¹University of Ulsan, College of Medicine, Korea, ²Asan Medical Center, Korea
- [P1-04] A Single-cell Protein Profiling of Organ-scale Tissues**
 Sehun Kim, Hyeongryool Park, Wonjin Cho, Thananya Charoenpattarawut, and Young-Gyun Park
Korea Advanced Institute of Science and Technology, Korea
- [P1-05] Precision-enhanced Multispectral Fluorescence Lifetime Measurement Using Avalanche Photodiode**
 Seohyoung Jeon, Jeongmoo Han, Soonyong Kwon, Hyeong Soo Nam, and Hongki Yoo
Korea Advanced Institute of Science and Technology, Korea
- [P1-06] Label-free Imaging of Goblet Cells (GCs) and Subepithelial Immune Cells in Conjunctiva**
 Noseong Park, Suil Jeon, and Ki Hean Kim
Pohang University of Science and Technology, Korea
- [P1-07] Image-based Semi-Quantitative Analysis of Multiplex Immunochromatographic Strip for Antibiotic Residues Detection in Milk**
 Minsuk Lee, Seungkye Go, and Seungrag Lee
Osong Medical Innovation Foundation, Korea
- [P1-08] Enhancing obSTORM Imaging Performance via Cubic Spline PSF Modeling**
 Donghoon Koo, Minchol Lee, Youngseob Lee, and Jeongmin Kim
Seoul National University, Korea
- [P1-09] Refractive Index-Matched STORM Imaging Buffer for Immersion Oil Objectives**
 Youngseop Lee, Yeunho Lee, Minchol Lee, Donghoon Koo, Dongwoo Kim, Hongrae Kim, Kangwon Lee, and Jeongmin Kim
Seoul National University, Korea
- [P1-10] High Resolution Live Cell Surface Imaging via Random Illumination Based Nanospeckle Microscopy**
 Sukhyeon Ka¹, Hajun Yoo¹, Minghao Wang¹, Kwanhwi Ko¹, Sara Ait Abderrahmane², and Donghyun Kim¹
¹Yonsei University, Korea, ²University of Limoges, France
- [P1-11] Morphological Monitoring of Single Cell Apoptosis and Necrosis Using Multi-modal Full-field Optical Coherence Tomography**
 Kyeong Ryeol Kim¹, Suyeon Kang¹, Jun Ki Kim^{1,2}, and Woo June Choi³
¹University of Ulsan, College of Medicine, Korea, ²Asan Medical Center, ³Chung-Ang University, Korea
- [P1-12] Simultaneous Multiplane Super-Resolution Imaging of Multicolor Fluorescence via Reflector-Assisted Speckle Illumination**
 Ming-Hao Wang, Hajun Yoo, Kwanhwi Ko, Sukhyeon Ka, Seungwoo Lee, and Donghyun Kim
Yonsei University, Korea
- [P1-13] Lipid-selective Photoacoustic Microscopy Using a Pulsed 1720 nm SRS Fiber Amplifier**
 Sang Min Park, Seongjin Bak, Jeesu Kim, Chang-Seok Kim, and Hwidon Lee
Pusan National University, Korea
- [P1-14] 3D easySTED Nanoscopy Illumination Optics for Simplified Beam Alignment**
 Jiyeon Chung, Ilkyu Park, and Dong-Ryoung Lee
Soongsil University, Korea



- [P1-15] A Handheld Contact-mode Imaging Device for Easy Assessment of Human Conjunctival Goblet Cells**
 Arnab Shil, Jieun Yun, Suil Jeon, Seonghan Kim, and Ki Hean Kim
Pohang University of Science and Technology, Korea
- [P1-16] Development of a Predclinical Stress Urinary Incontinence Model for Laser Treatment**
 Hwarang Shin, Jihye Jo, Myungji Kang, and Hyun Wook Kang
Pukyong National University, Korea
- [P1-17] In Vitro Photobiomodulation (PBM) Effects Against Intestinal Inflammation**
 Myungji Kang, Hwarang Shin, Jihye Jo, and Hyun Wook Kang
Pukyong National University, Korea
- [P1-18] AI-assisted Surface Enhanced Raman Spectroscopy (SERS) Monitoring of Hepatic Ischemia-reperfusion Animal Model After Liver Transplantation**
 Sanghwa Lee¹, Jeongmin Oh¹, Kyeong Ryeol Kim², Joonseup Hwang², Suyeon Kang², Jung-Man Namgoong³, Jun Ki Kim^{1,2,*}
¹Asan Medical Center, Korea, ²University of Ulsan, College of Medicine, Korea
- [P1-19] Diagnosis of Interstitial Cystitis and Overactive Bladder Disease Using Discriminant Analysis-based Surface-Enhanced Raman Spectroscopy (SERS)**
 Minju Cho^{1,2}, Seunghee Lee², Gayeong Kim^{2,3}, Jun Ki Kim^{1,2}
¹University of Ulsan, College of Medicine, Korea, ²Asan Medical Center, Korea, ³Sookmyeong Women's University, Korea
- [P1-20] Non-Invasive Blood Glucose Monitoring on Earlobe: A Comparative Study of MW-SP-NIRS vs. Alternative Sensing Technologies**
 Jongdeog Kim, Bong Kyu Kim, Hyoyoung Cho, and Chul Huh
Electronics and Telecommunications Research Institute, Korea
- [P1-21] Microspectrometer-based Photoplethysmography for High-fidelity Morphological Analysis**
 Geon-Hui Han, Jung-Woo Park, Jaehyeok Park, Gi Beom Kim, Jongsoo Kim, and Ki-Hun Jeong
Korea Advanced Institute of Science and Technology, Korea
- [P1-22] Non-invasive Glucose Detection Using SWIR Quantum Dot**
 Beom Kwan Kim^{1,2}, Ho-Hyun Yang^{1,2}, Abdallah Karmallawi^{1,2,3}, Dongeon Kim², Se-Woong Baek², and In-Ho Bae¹
¹Korea Research Institute of Standards and Science, Korea, ²Korea University, Korea, ³National Institute of Standards, Egypt
- [P1-23] Predclinical Evaluation of Thermal Safety for a Monopolar RF Device**
 HaeJin Im, ChaeLim Bong, and Young-Seok Seo
WONTECH Co., Ltd., Korea
- [P1-24] Characterization of Atherosclerotic Plaque Components via Phasor Analysis of Fluorescence Lifetime Imaging Combined with Optical Coherence Tomography**
 Jeongmoo Han¹, Sunwon Kim^{2,3}, Hyeong Soo Nam¹, Dong Oh Kang², Jin Won Kim², and Hongki Yoo¹
¹Korea Advanced Institute of Science and Technology, Korea, ²Korea University Guro Hospital, Korea, ³Korea University Ansan Hospital, Korea
- [P1-25] Integrated OCT-NIRF-PDT Theranostic Catheter for Precise Diagnosis and Treatment of Atherosclerotic Plaques**
 Yeon Hoon Kim¹, Jin Hyuk Kim², Youngeun Cho¹, Ryeong Hyun Kim², Hyun Jung Kim², Kyeongsoon Park³, Jin Won Kim², and Hongki Yoo¹
¹Korea Advanced Institute of Science and Technology, Korea, ²Korea University Guro Hospital, Korea, ³Chung-Ang University, Korea
- [P1-26] Depth-sensitive Diffuse Reflectance Spectroscopy for in-vivo Skin Characterization**
 Jaehyeok Park, Jung-woo Park, Geon-Hui Han, Gi Beom Kim, Jongsoo Kim, and Ki-Hun Jeong
Korea Advanced Institute of Science and Technology, Korea
- [P1-27] Hemodynamic Muscle Activity Monitoring Using Multi-Wavelength Optical Myography**
 Jongsoo Kim, Jaehyeok Park, and Ki-hun Jeong
Korea Advanced Institute of Science and Technology, Korea
- [P1-28] Longitudinal In Vivo Visible Light OCT Imaging of Mouse Retina for Early Detection of Alzheimer's Disease**
 Shuo Wang¹, Songzhi Wu¹, Baihan Li¹, Zi Jin², Meixiao Shen², and Zhao Wang¹
¹University of Electronic Science and Technology of China, China, ²Wenzhou Medical University, China



- [P1-29] Optical Evaluation of Lymphatic Function Restoration via High-Intensity Exercise in a Lymphedema Model**
 Hwayeong Cheon¹ and Jae Yong Jeon^{1,2}
¹Asan Medical Center, Korea, ²University of Ulsan, College of Medicine, Korea
- [P1-30] Enhanced Acoustic Resolution Photoacoustic Microscopy with Measured Impulse Response-based SAFT**
 Kisik Kim
 Ulsan National Institute of Science and Technology, Korea
- [P1-31] Layer-Resolved Quantitative Analysis of Retinal OCTA: A Potential Diagnostic Marker for AMD Treatment Efficacy**
 Sungwoo Park¹, Seungchan Han¹, Hyunji Lee^{2,3}, Yeonha Kim¹, Ayun Seol¹, Dayeon Hwang¹, Sangwon Lee^{2,3}, Younghwa Jung¹, and Tae Joong Eom¹
¹Pusan National University, Korea, ²Korea Research Institute of Standards and Science, Korea, ³Korea National University of Science and Technology, Korea
- [P1-32] Ultrasound-Based Quantification of Dermal Density Changes Following Photobiomodulation**
 Se Young Lee, Dong Hwan Ko, and Byung Jo Jung
 Yonsei University, Korea
- [P1-33] 3D Occlusal Surface Reconstruction with a Lensless Imager**
 Hyo Jun Ahn¹, Hojin Chang¹, Taeyoung Kim², Yong Guk Kang¹, Jongho Kim¹, Donggeon Bae¹, Jaewoo Jung^{1,2}, Nakkyu Baek², Joonsik Park², Kyung Chul Lee¹, and Seung Ah Lee¹
¹Seoul National University, Korea, ²Yonsei University, Korea
- [P1-34] Cross-Device Domain Adaptation via Style Transfer for AI-based Diagnostic Precision of Mobilized Otoscopes in Ear Diseases**
 Minseok Kwon¹, Hyunmo Yang¹, Nurbolat Aimakov¹, Sanzhar Askaruly¹, Chaerin Hwang¹, Jeong Hun Jang², and Woonggyu Jung¹
¹Ulsan National Institute of Science and Technology, Korea, ²Ajou University School of Medicine, Korea
- [P1-35] Development of an Analytical Ray Tracing Model for GRIN Rod Lens Imaging Probe Design**
 Jin Young Youm^{1,2}, and Joon-Mo Yang¹
¹Ulsan National Institute of Science and Technology, Korea, ²Nambu University, Korea
- [P1-36] Multifunctional Surgical Microscope-Integrated Optical Coherence Tomography for Real-Time Guidance and Volumetric Histopathological Analysis in Brain Tumor Surgery**
 Myungju Kim¹, Yeonwoo Baek¹, Eunji Lee¹, Sangjin Lee¹, Geoseong Na¹, Junseong Kim¹, Jung-Jae Kim², Youngbin Tchoe¹, and Woonggyu Jung¹
¹Ulsan National Institute of Science and Technology, Korea, ²Yonsei University College of Medicine, Korea
- [P1-37] High-Speed Volumetric Imaging of the Cornea Using Scanning Light Field Microscopy**
 Jisang Lee, Noseong Park, and Kihean Kim
 Pohang University of Science and Technology, Korea
- [P1-38] High-resolution High-contrast Phase Imaging of Corneal Nerves and Immune Cells in Mouse Cornea, in Vivo**
 Suil Jeon¹, Noseong Park¹, Chang Ho Yoon², Kyoung Woo Kim³, Ki Hean Kim¹
¹Pohang University of Science and Technology, Korea, ²Seoul National University Hospital, Korea, ³Chung-Ang University College of Medicine, Korea
- [P1-39] Digital Aberration Correction Using Aberration Matrix and Optical Memory Effect**
 ChulMin Oh¹, Herve Hugonnet¹, Moosung Lee^{1,2}, and YongKeun Park^{1,3}
¹Korea Advanced Institute of Science and Technology, Korea, ²Universität Stuttgart, Germany, ³Tomocube, Inc., Korea
- [P1-40] Vector Rytov Approximation for Tomography of Anisotropic Materials**
 ChulMin Oh¹, Herve Hugonnet¹, Juheon Lee¹, and YongKeun Park^{1,2}
¹Korea Advanced Institute of Science and Technology, Korea, ²Tomocube Inc., Korea
- [P1-41] Investigation of Craquelure Patterns in Oil Paintings Using Precise 3D Morphological Analysis for Art Authentication**
 Soojung Kim, Mihee Park, Hyerin Song, Tae Young Kang, Seunghun Lee, Tae Rim Yoon, Byungsuk Lee, Tuli Anamika Biswas, Seonu Jeong, Seheon Jeong, Yubin Lee, and Kyujung Kim
 Pusan National University, Korea
- [P1-42] Comparative Assessment of Light-Sheet and Spinning Disk Confocal Microscopy for Optimized 3D Imaging of Cleared Biological Samples**
 Youngjae Ryu, Sung Rae Kim, and Chang Man Ha
 Korea Brain Research Institute, Korea



- [P1-43] Development of an OCT–SLO Imaging System for Retinal Studies in Preclinical Animal Models**
 Hyun-Ji Lee^{1,2}, Tae Geol Lee^{1,2}, and Sang-Won Lee^{1,2}
¹Korea Research Institute of Standards and Science, Korea, ²Korea National University of Science and Technology, Korea
- [P1-44] Deep Learning-Enabled Rapid Virtual Staining and Automated Cancer Classification using High-Throughput Digital Slide Scanner**
 Santanu Misra¹, Sei Na², Kyoungsook Park², Chiho Yoon³, Sampa Misra³, Chulhong Kim³, Sang Yong Song¹, Hyung Kyung Kim², and Byullee Park¹
¹Sungkyunkwan University, Korea, ²Samsung Medical Center, Korea, ³Pohang University of Science and Technology, Korea
- [P1-45] Dual-Contrast Optical Coherence Tomography for Quantitative Assessment of Immune- and Drug-Induced Cytotoxicity in 3-D Tumor Spheroids**
 Ingyoung Kim¹, Seokgyu Han², Baekcheon Seong¹, Woovin Kim¹, Yewon Kim¹, Younghun Kim¹, Chulmin Joo¹, and Sungsu Park²
¹Yonsei University, Korea, ²Sungkyunkwan University, Korea
- [P1-46] Depth of Focus-Enhanced Optical Coherence Tomographic Imaging Using of Chromatic Focal Shifting of Geometric Phase Lens**
 Hyun Sung Kim, Hye Jun Ma, and Eun Seo Choi
 Chosun University, Korea
- [P1-47] Deep Learning Solution for Concurrent Speed and SNR Enhancement in Multi-spectrometer SD-OCT of Retinal Images**
 Ju Hwan Lee¹, Sang Hyuk Suh¹, Yudan Chen², Jun Song², Myeong Jin Ju², and Hee-Jae Jeon¹
¹Kangwon National University, Korea, ²University of British Columbia, Canada
- [P1-48] Label-Free Drug Response Evaluation in Organoids via Ultraviolet Photoacoustic Microscopy**
 Hyunjun Kye¹, Won Jong Yu¹, Jeesu Kim², Jong-Chan Park¹, and Byullee Park¹
¹Sungkyunkwan University, Korea, ²Pusan National University, Korea
- [P1-49] Geometric Phase Lens-based Compact Circumferential Surface Profiling Probe**
 Hyun Sung Kim, Hye Jun Ma, and Eun Seo Choi
 Chosun University, Korea
- [P1-50] In Vivo Observations of Zebrafish Retinal Responses by Light Exposure Using Optical Coherence Tomography**
 Hang Chan Jo and Dae Yu Kim
 Inha University, Korea
- [P1-51] Two-photon Oblique Light Sheet Microscopy with Enhanced SNR Using Low Repetition Rate Light Source**
 Jeonggeun Song, Woojin Lee, Hyeong Soo Nam, Hamin Park, Young-Gyun Park, and Hongki Yoo
 Korea Advanced Institute of Science and Technology, Korea
- [P1-52] Multidimensional Assessment of Enamel Microcrack Progression Following Orthodontic Debonding Using OCT Incorporated Image Processing**
 Sm Abu Saleah, Daewoon Seong, Euimin Lee, Yoonseok Kim, Hayoung Kim, Hyunmo Kim, Hyungseo Jeon, Bosung Kim, Sungbin Yun, Tinaya Wijethunge, Nipun Shantha Kahatapitiya, Jannat Amrin Luna, Shinheon Kim, Sangyeob Han, Mansik Jeon, and Jeehyun Kim
 Kyungpook National University, Korea
- [P1-53] Data Compression and Resolution Optimization for Hyperspectral Microscopy in H&E Pathology**
 Do Hyeon Son and Jong Hee Yoon
 Ajou University, Korea
- [P1-54] Development of a Laser Speckle Imaging Method for Enhanced Nanoparticle Detection in Liquid Media**
 Jeonggyo Kim and Jonghee Yoon
 Ajou University, Korea
- [P1-55] Quantitative Analysis of Scattering Properties via Speckle Illumination-Based Spatial Frequency Domain Imaging**
 Seongmin Jo and Jonghee Yoon
 Ajou University, Korea
- [P1-56] Color Space Mapping from Hyperspectral Imaging Data for Colorimetric Analysis**
 Nahyun Lee and Jonghee Yoon
 Ajou University, Korea



- [P1-57] Rapid and Accurate Antibiotic Susceptibility Testing Method Using Laser Speckle Imaging**
 Jongseo Lee¹, Seongjoon Moon¹, Donghyeok Kim¹, Kyoungman Cho², Changan Lee¹, and Jonghee Yoon¹
¹Ajou University, Korea, ²The Wave Talk., Inc., Korea
- [P1-58] Phase-Resolved Optical Coherence Microscopy Using Wavelength Segmentation of Stretched-Pulse Mode-Locked Laser**
 Jaeheung Kim¹, Seongjin Bak¹, Gyeong Hun Kim², Hwidon Lee¹, and Chang-Seok kim¹
¹Pusan National University, Korea, ²Massachusetts General Hospital and Harvard Medical School, USA
- [P1-59] Full-Range OCT with Fourfold Depth Extension Using 4×4 Fiber Coupler and Dual Reference System**
 Yeongbin Jeon, Jaeheung Kim, Chang-Seok Kim, and Hwidon Lee
 Pusan National University, Korea
- [P1-60] Spatiotemporal Focusing Through Scattering Medium Using Time-gated Digital Optical Phase Conjugation**
 Seungmin Lee and Mooseok Jang
 Korea Advanced Institute of Science and Technology, Korea
- [P1-61] High-Resolution Label-Free Imaging Through Complex Biological Samples Using Visible-Wavelength Reflection Matrix Microscopy**
 Jaecheol Cho, Eunyong Seong, Sungsam Kang, and Wonshik Choi
 Korea University, Korea
- [P1-62] Oblique Back-illumination Microscopy at 1650 nm Wavelength**
 Yechan Cho, Jin Hee Hong, Wonshik Choi, and Yookyung Jung
 Korea University, Korea
- [P1-63] Wavelength-segmented Phase Imaging to Extend Axial Range in Full-field Optical Coherence Microscopy**
 Minju Jeong, Jaeheung Kim, Chang-Seok Kim, and Hwidon Lee
 Pusan National University, Korea
- [P1-64] Volumetric Quantification of Mouse Spinal Cord with Serial Optical Coherent Tomography and Semi-Supervised Learning for Efficient Segmentation**
 Eunji Lee, Sangjin Lee, Myungju Kim, SunYeong Choi, Nakyoung Lee, Sang Jin Im, HyungJoon Cho, and Woonggyu Jung
 Ulsan National Institute of Science and Technology, Korea
- [P1-65] Unexpected High-Frequency Photoacoustic Wave Generation with Long Laser Pulses**
 Haneul Lee¹, Jin Young Youm^{1,2}, Yikeun Kim¹, Wonhak Son¹, Minjae Kim¹, Gyeong Tae Kim¹, Sung Chul Bae¹, Joon-Mo Yang¹, and Lihong V. Wang³
¹Ulsan National Institute of Science and Technology, Korea, ²Nambu University, Korea, ³California Institute of Technology, USA
- [P1-66] Equivalent Test Optical System (ETOS) for Verifying Optical Working Distance of Miniature Imaging Probe**
 Jin Young Youm^{1,2} and Joon-Mo Yang¹
¹Ulsan National Institute of Science and Technology, Korea, ²Nambu University, Korea
- [P1-67] SNR Maximization Strategy by Intended Saturation and Compensation in Swept-Source Optical Coherence Tomography**
 Gyeongho Kim, Hyeongsoo Nam, Woojin Lee, and Hongki Yoo
 Korea Advanced Institute of Science and Technology, Korea
- [P1-68] Attention-Driven Multi-Scale Denoising Network for Full-Field Photoacoustic Displacement Imaging**
 Muhammad Awais, Minseo Cho, and Byeongha Lee
 Gwangju Institute of Science and Technology, Korea
- [P1-69] Kilohertz-Rate Dual-Mode Imaging of Neuronal and Vascular Dynamics with an Event-Based Camera**
 Fatemeh Dehghan Nezhad¹, Yejin Kim¹, Daeun Roh¹, Alazar Tadele Kebede¹, Young Ro Kim^{2,3}, Hyuk-Sang Kwon¹, and Euiheon Chung¹
¹Gwangju Institute of Science and Technology, Korea, ²Massachusetts General Hospital, USA, ³Harvard Medical School, USA
- [P1-70] Near-infrared Optical Nanoprobes for Dynamic Neurochemical Imaging**
 Dakyeon Lee, Yunseo Jeong, and Sanghwa Jeong
 Pusan National University, Korea
- [P1-71] A CNN-based Approach for Real-Time Acute Stroke Diagnosis Using Restingstate NIRS**
 Seung Hyun Lee, Zephaniah Phillips, ByungJun Park, and Beop-Min Kim
 Korea University, Korea



[P1-72] Effects of Obstructive Sleep Apnea on Cerebral Oxygenation in Cognitively Normal Older Adults: A Simultaneous Polysomnography-fNIRS Study

Chang Hyun Park, Hwan Wook Shim, Young-Min Lee, Chang-Seok Kim, and Hwidon Lee
Pusan National University, Korea

[P1-73] Light-field Deep Learning Platform with High Depth-of-view and Cellular Resolution Towards Organoid Imaging

Tien Nhat Nguyen, Youngseung Yoo, An Nazmus Sakib, Akm Ashiquzzaman, Hyuk Sang Kwon, and Euiheon Chung
Gwangju Institute of Science and Technology, Korea

[P1-74] Longitudinal In Vivo Spinal Cord Visualization with Surgical OCT and a Lightweight Miniaturized Window Chamber

SunYeong Choi^{1,2}, Myungju Kim¹, Eunji Lee¹, Geoseong Na¹, Yeonwoo Baek¹, Nakyung Lee¹, and Woonggyu Jung¹
¹Ulsan National Institute of Science and Technology, Korea, ²Institute for Basic Science, Korea



PROGRAM_OCTOBER 31 (FRI.)

Keynote Session V: Nanobiophotonics

Room A [Diamond Hall, Annex (1F)]

October 31 (Fri.) / 09:00~10:30

Chairs: Yong-Sang Ryu (Korea University) and Inki Kim (Sungkyunkwan University)

[Keynote 5-1] Visualizing Large-scale Biological Conversion Processes in Real-time

09:00~09:30

Taewook Kang

Sogang University, Korea

[Keynote 5-2] Meta-optic Interfaces for Molecular Sensing and Biomedical Imaging

09:30~10:00

Haoran Ren

Monash University, Australia

[Keynote 5-3] Spatially Encoded Molecular Spectroscopy with Spectrally Selective Metasurfaces

10:00~10:30

Andreas Tittl

Ludwig-Maximilians-University Munich, Germany

Keynote Session VI: Biophotonic Enabling Technologies

Room A [Diamond Hall, Annex (1F)]

October 31 (Fri.) / 11:00~12:30

Chairs: Young Min Song (Gwangju Institute of Science and Technology) and Jae-Woong Jeong (Korea Advanced Institute of Science and Technology)

[Keynote 6-1] Quantitative Combination of Photoacoustic and Ultrasound Imaging

11:00~11:30

Ivana Falco, Charlotte Constans, Emmanuel Bossy, and Bastien Arnal

Université Grenoble Alpes, CNRS, France

[Keynote 6-2] Nanophotonics for Vibrational Sensing and Imaging

11:30~12:00

Sang-Hyun Oh

University of Minnesota, USA

[Keynote 6-3] Implantable Optoelectronic Devices for Advanced Neural Interfaces

12:00~12:30

Xing Sheng

Tsinghua University, China


Plenary Talk II

Room A [Diamond Hall, Annex (1F)]

October 31 (Fri.) / 13:30 – 14:20

Chair: Seung Ah Lee (Seoul National University)

Qionghai Dai

Tsinghua University, China

Qionghai Dai is a full Professor at Tsinghua University, the Academician of Chinese Academy of Engineering, Dean of the School of Information Science and Technology, and the director of the Institute of Brain and Cognitive Sciences at Tsinghua University. He is also the chairman of Chinese Association for Artificial Intelligence. Qionghai's research centers on the interdisciplinary study of optics, informatics, neuroscience, and cognitive sciences, with hundreds of journal papers published in *Nature*, *Cell*, *Nature Biotechnology*, etc. In the past decades, he has

invented a series of mesoscale imaging systems and data analysis methods, facilitating simultaneous multi-scale observation of biological dynamics spanning from organelles, cells, tissue, and organs in different pathological or physiological states at a system level. He is now working on system neuroscience, artificial intelligence, computational imaging, large-scale data analysis methods, and neuromorphic optoelectronic devices.

Mesoscale Intravital Fluorescence Microscopy: A Decades-Long Journey from Concept to Innovation

Biology is a typical discipline covering multiple scales. While cryo-EM and super-resolution imaging enables intracellular imaging of proteins and organelles in microscale, CT and MRI facilitates organ-level imaging in macroscale at tissue resolution. There has long been a missing gap of imaging instruments in mesoscale to observe the large-scale interactions of cells, which is the basic unit of life, in the native mammalian environment during diverse pathological and physiological states. In this talk, I will share our long journey in the past decades for the development of mesoscale intravital fluorescence microscopy and analysis algorithms. While we have exploited some preliminary applications in neuroscience, oncology, immunology, and pharmacy, we believe there is a great treasure awaits discovery.

Keynote Session VII: Computational Optics and AI

Room A [Diamond Hall, Annex (1F)]

October 31 (Fri.) / 14:40~16:10

Chairs: Chulmin Joo (Yonsei University) and Mooseok Jang (Korea Advanced Institute of Science and Technology)

[Keynote 7-1] Feature-domain Phase Retrieval for Computational Microscopy

14:40~15:10

Liangcai Cao

Tsinghua University, China

[Keynote 7-2] Computational Imaging with Randomness

15:10~15:40

Ryoichi Horisaki

The University of Tokyo, Japan

[Keynote 7-3] Adaptive Optical Correction for in Vivo Fluorescence Microscopy Using Machine Learning

15:40~16:10

Iksung Kang and Na Ji

University of California, USA


Poster Session II

Ruby I & II, Tower A (3F)

October 31 (Fri.) / 16:30~18:30

- [P2-01] All-in-one Nanoplasmonic Platform for Sequential Photothermal Cell Lysis and RPA-CRISPR/Cas Assay**
 Eun-Sil Yu, Jaemyeong Kwon, Hyejeong Jeong, Hye-Jin Chang, and Ki-Hun Jeong
Korea Advanced Institute of Science and Technology, Korea
- [P2-02] Enhanced Backscattering Spectroscopy for the Optical Characterization of Micro- and Nanoplastics**
 Ik Hwan Kwon, Jun Hui Jeon, Tae Goel Lee, and Sang Won Lee
Korea Research Institute of Standards and Science, Korea
- [P2-03] LED-driven Plasmoporation for Cost-effective and Scalable Intracellular Delivery in Suspension Cells**
 Hamin Na, Chomin Lee, Junhee Han, Young-Gil Cha, Ji-Ho Park, and Ki-Hun Jeong
Korea Advanced Institute of Science and Technology, Korea
- [P2-04] Selective Neurotransmitter Dynamics Observation Enabled by a Terahertz-Nanodisc Metasurface Sensing Platform**
 Taeyeon Kim^{1,2}, Yeon Kyung Lee^{1,2}, Hyun Seok Song^{1,2}, and Minah Seo^{1,2}
¹Korea University, Korea, ²Korea Institute of Science and Technology, Korea
- [P2-05] Coincident Fluorescence-Burst Analysis of Actin Cargo Molecules in Secreted Single Diffusing Extracellular Vesicles from Human Induced Pluripotent Stem Cells**
 Dang Du Nguyen¹, Aleksandr Barulin³, Won Jong Yu¹, Jong-Chan Park¹, and Inki Kim¹
¹Sungkyunkwan University, Korea, ²Moscow Center for Advanced Studies, Russia
- [P2-06] Multifocal Metalens for Image Scanning Microscopy**
 Yongjae Jo¹, Hyemi Park¹, Seho Lee¹, Hyeyoung Yoon^{1,2}, Taehoon Lee¹, Gyu Soo Bak¹, Jong-Chan Park¹, and Inki Kim¹
¹Sungkyunkwan University, Korea, ²Korea Institute of Science and Technology, Korea
- [P2-07] Decoding NV Center Orientations by Polarization-Modulated Super-Resolution Localization Microscopy**
 BinChan Joo, DongHee Park, JaeHwan Yoo, and YeonUi Lee
Chungbuk National University, Korea
- [P2-08] Excitonically Enhanced Polarization-Resolved Scattering Imaging in Dark-Field Microscopy**
 Dong Hee Park, Bin Chan Joo, and Yeon Ui Lee
Chungbuk National University, Korea
- [P2-09] Ultrasensitive pH Detection in Cell Culture Media via Surface-Enhanced Raman Scattering of Halochromic Phenol Red**
 Min Chung, Hamin Na, and Ki-Hun Jeong
Korea Advanced Institute of Science and Technology, Korea
- [P2-10] Development of a Nanocavity SERS Substrate for On-Chip Real-Time Molecular Detection**
 Sejin Lee and Ki-Hun Jeong
Korea Advanced Institute of Science and Technology, Korea
- [P2-11] Super-resolution 3D Photoacoustic Imaging of Human Brain Organoids via 20× Iterative Expansion Microscopy and Chromogenic Absorber**
 Jungah Kim, Yongjae Jo, and Inki Kim
Sungkyunkwan University, Korea
- [P2-12] Wearable Optofluidic Patch for Efficient Sweat Collection and Label-Free Analysis**
 Jaehun Jeon and Ki-Hun Jeong
Korea Advanced Institute of Science and Technology, Korea
- [P2-13] Dielectrophoresis-Assisted SERS Platform for Label-Free Single-Cell Profiling Based on Frequency-Dependent Molecular Signatures**
 Kwanhwi Ko¹, Hajun Yoo¹, MingHao Wang¹, Ken-Tye Yong², and Donghyun Kim^{1,3}
¹Yonsei University, Korea, ²The University of Sydney, Australia, ³The Chinese University of Hong Kong, Hong Kong



- [P2-14] Therapeutic Effects of Graphene Quantum Dots in Pterygium**
 Minji Kim¹, Donghoon Koo¹, Hyun Seung Yang^{1,2}, and Jeongmin Kim¹
¹Seoul National University, Korea, ²Seoul Shinsegae Eye Center, Korea
- [P2-15] Chiral and Molecular Identification of Monosaccharides by Surface-Enhanced Raman Spectroscopy**
 Daedu Lee, Jaehwan Jung, and Yoonsoo Pang
 Gwangju Institute of Science and Technology, Korea
- [P2-16] Synthesis and Characterization of SiO₂-coated BCP: Yb³⁺, Er³⁺ Upconversion Phosphors for Biomedical Applications**
 E. Swetha, W. Kim, S-J. Kim, and G.B. Jung
 Chosun University, Korea
- [P2-17] Smartphone-based Multiplexed Lateral Flow Assay Using RGB Quantum Beads for Rapid Diagnostics of Respiratory Viruses**
 Myeonghoon Choi¹, Seungho Lee², Yuha Choi¹, Jiwon Seo¹, Geoseong Na¹, Juho Lee¹, Jongnam Park^{1,2}, and Woonggyu Jung¹
¹Ulsan National Institute of Science and Technology, Korea, ²UNIQDOT, Korea
- [P2-18] Revealing Chemical Interface Damping in Bimetallic Ag-Coated Au Nanorods Featuring Exposed Au Tips**
 Geun Wan Kim¹, Seunghyun Lee², and Ji Won Ha¹
¹University of Ulsan, Korea, ²Hanyang University, Korea
- [P2-19] Spatiotemporally Resolved, High-throughput Lensless Computational Microscopy**
 Yunhui Gao and Liangcai Cao
 Tsinghua University, China
- [P2-20] Optimization of Multi-layer Correction in Anti-scattering Structure for Enlarged Isoplanatic Patch**
 Sechan Park and Mooseok Jang
 Korea Advanced Institute of Science and Technology, Korea
- [P2-21] Deep Learning Model for Image Quality Enhancement of Sparsely Sampled Raster-Scan Data**
 Yoon Song and Jeesu Kim
 Pusan National University, Korea
- [P2-22] Reducing Bias and Enhancing Accuracy in Brain Tumor Diagnosis Using Feedback-Aware Attention System (FAAs) Integrated U-Net**
 Rostam Aghaei¹, Jeongmin Oh², Kyeong Ryeol Kim¹, and Jun Ki Kim^{1,2}
¹University of Ulsan, College of Medicine, Korea, ²Asan Medical Center, Korea
- [P2-23] Computational Analysis of Wall Shear Stress in Atherosclerosis Induced ApoE - KO Mouse Model**
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Shudha Tasnim Iqbal¹, Sehui Chang², Euiheon Chung¹, and Young Min Song²

¹Gwangju Institute of Science and Technology, Korea, ²Korea Advanced Institute of Science and Technology, Korea



PROGRAM_November 1 (Sat.)

We are pleased to announce that the Tutorial Program of SPIE ABC 2025 will take place on Saturday, November 1, 2025, from 09:00 to 11:30, at the Diamond Hall, UTOP UBLESS Hotel Jeju. This session will provide participants with an opportunity to gain in-depth knowledge and practical insights from leading experts in the field, fostering both academic exchange and professional development.

Tutorial I

Diamond Hall, UTOP UBLESS Hotel Jeju

November 1 (Sat.) / 09:00 – 10:00

Beginner's Guide to Drawing a Photonical Figures/Illustration for Journal Paper/Project using 3D Rhino

Yong-Sang Ryu*Korea University, Korea*

Tutorial II

Diamond Hall, UTOP UBLESS Hotel Jeju

November 1 (Sat.) / 10:30 – 11:30

Light sheet fluorescence microscopy

Kihean Kim*Pohang University of Science and Technology, Korea*

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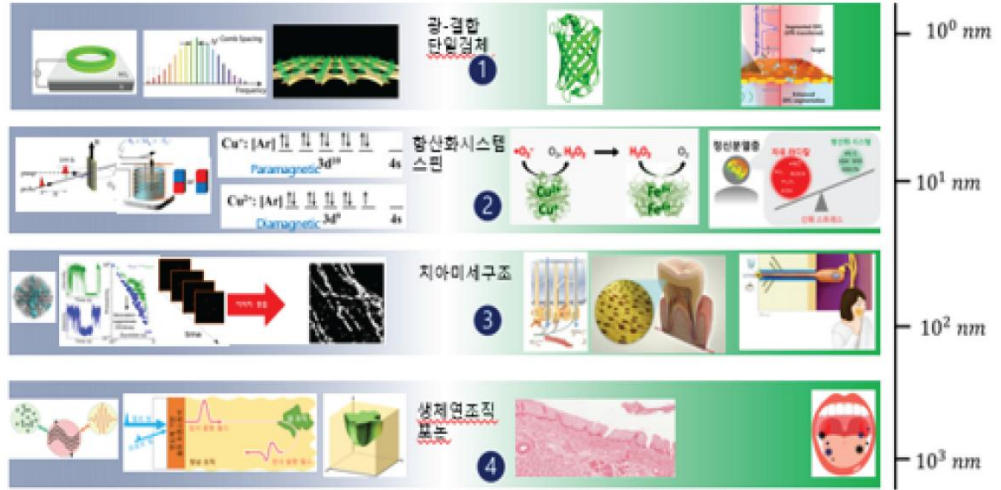


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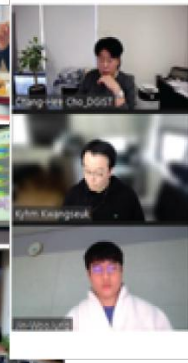
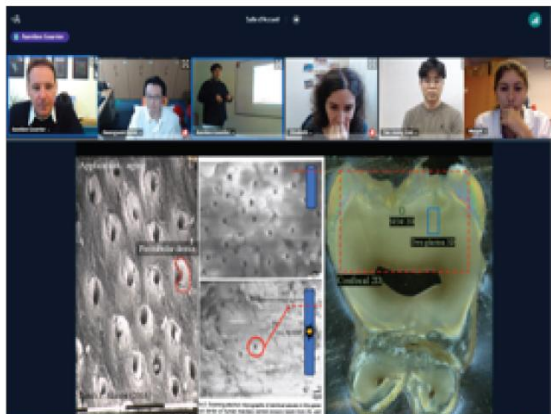
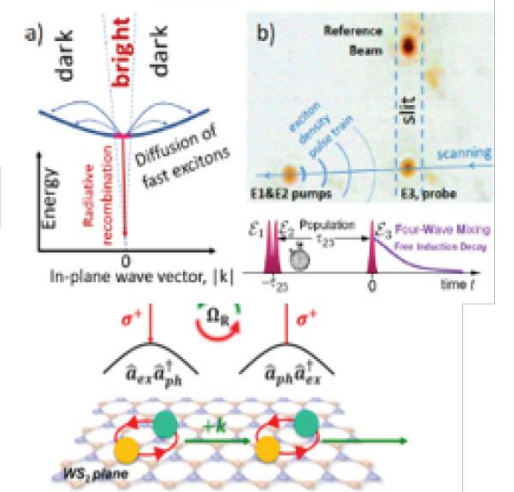
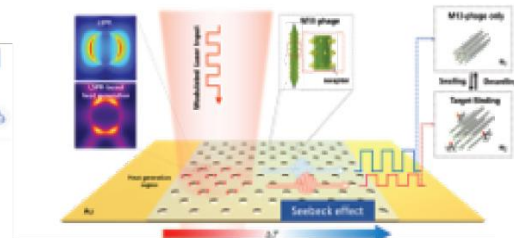
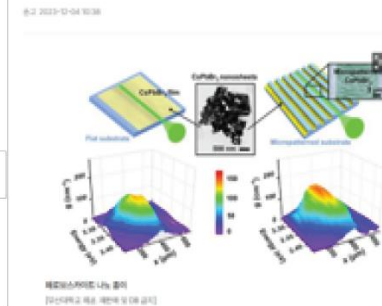
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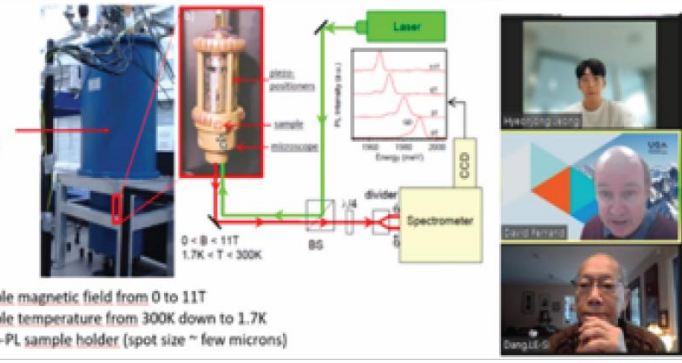
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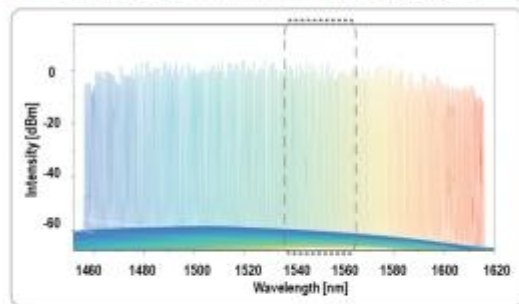
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연구센터 비전 및 전략

본 센터에서는 현재 초고령화가 급격히 진행되고 있는 동남 생활권 액티브 시니어의 건강 증진과 행복 추구를 위해 바이오 소재 기반 의료 소재 개발 및 스마트짐 내 생체신호의 실시간 모니터링 및 성인질환의 조기진단이 가능한 헬스케어 플랫폼 개발을 목표로 다양한 연구를 진행하고 있습니다.

연구개발 내용

- 1. 헬스케어용 원천소재 개발
- 2. 스마트 진단용 센서/의료 기기 개발
- 3. 헬스케어 빅데이터 구축 및 AI 서비스 시스템 구축



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입학생 주요 혜택

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1~5명 규모의 팀을 직접 구성하여 연구를 수행
팀별 지도교수 배정 및 프로젝트 연구 지원
과제 선정 및 발표 평가

단기 디지털 역량강화 교육

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대학이 협업하여 지능화기술 기반의
단기 디지털 역량 향상 프로그램을 운영

기업 운영에 필요한 핵심 교육 프로그램 운영

지역 협력 프로그램 운영 (R&D 사례 공유, 산학 네트워크 등)

ICRC
ICT융합연구센터
ICT Convergence Research Center

☎ 053-950-7198

✉ _chkim@knu.ac.kr

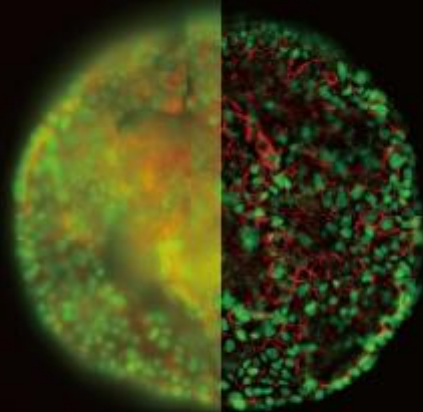
✉ kish@knu.ac.kr

📍 대구광역시 북구 대학교 80, (경북대학교) IT4호관 305-1호 ICT융합연구센터



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▶장비 데모가 필요하시면 언제든지 신청해주세요.
makim@emonsolution.co.kr



THUNDER Imager | Model Organism



THUNDER Imager | Tissue



THUNDER Imager | 3D Tissue



THUNDER Imager | 3D Cell Culture



THUNDER Imager | 3D Live Cell

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innovations enables spectral freedom**

Spectral Detection



Emission filter Free

AOBS



Tunable laser filter

White Light Laser

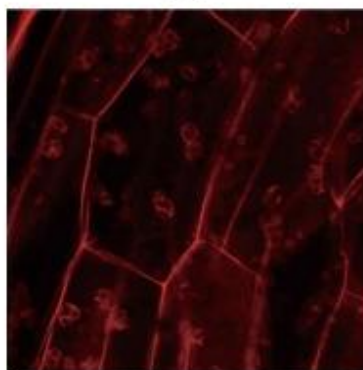
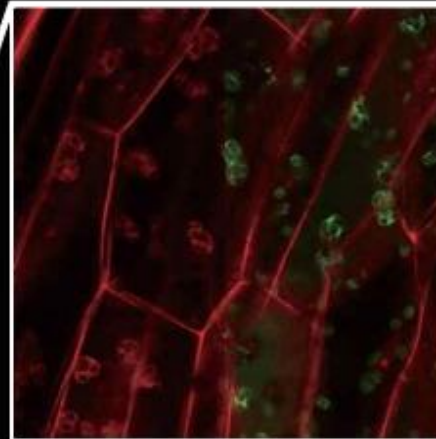


Tunable Laser

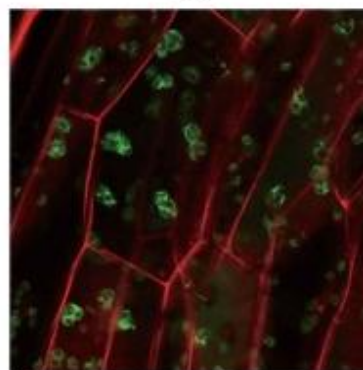
**Tau Scan &
Tau Separation**



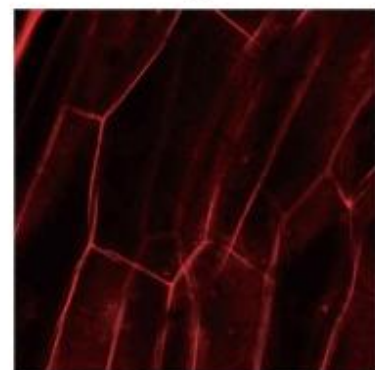
Cell Wall → PI
Chlorophyll → Autofluorescence



Cell Wall → PI
Chlorophyll → Autofluorescence



Cell Wall → PI
Chlorophyll → Autofluorescence



Cell Wall → PI

장비 데모 시현이 필요하세요? 언제든지 요청하세요
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Laser

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- LD
- LED
- Nd:YAG Laser
- SLD
- Tunable Laser

Optical Components



Optical Components

- Acousto-Optic Devices
- Autocorrelator
- CCD Camera
- Galvanometer scanner
- Laser Beam Diagnostic
- OCT
- OCTS Spectral Engine
- Optical Isolator
- Optical Power/Energy Meter
- Spectrometer
- Photon Counting System
- Photon Timing System
- TCSPC
- Wavelength Meter

Fiber Optic & Others



Fiber Optic Components

- Optical Fiber
- Tunable Filter
- Circulator
- Coupler
- Switch
- WDM
- VOA

Others

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- Motion Control Products
- Optics
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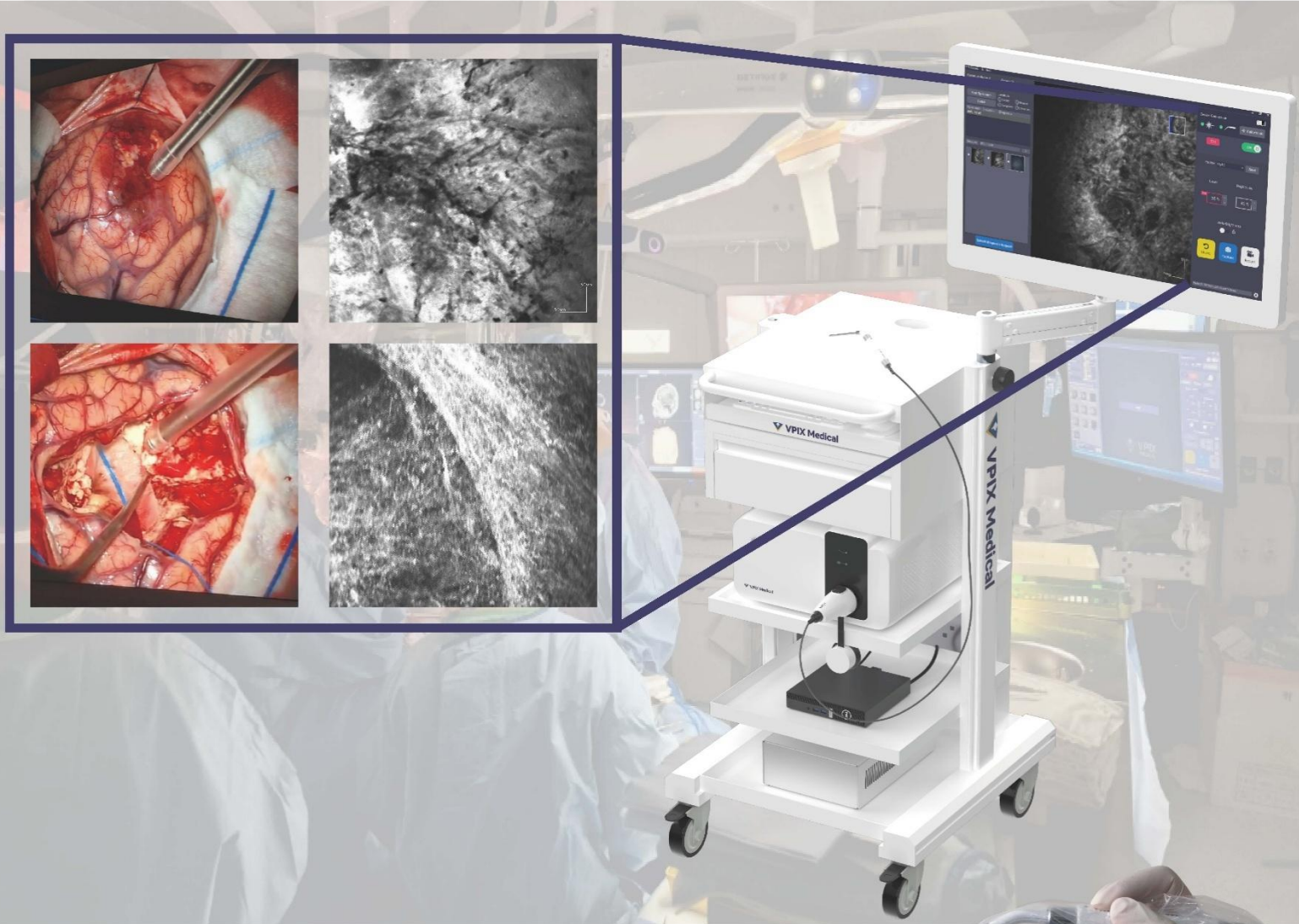
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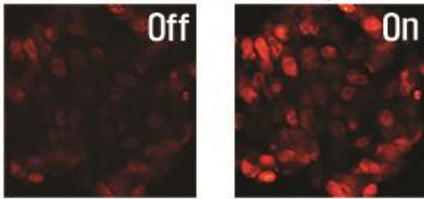


Transmissive Wavefront Modulator DELTA 7

The first implementation of a Deformable Phase Plate into a commercial product



Two-Photon Microscopy



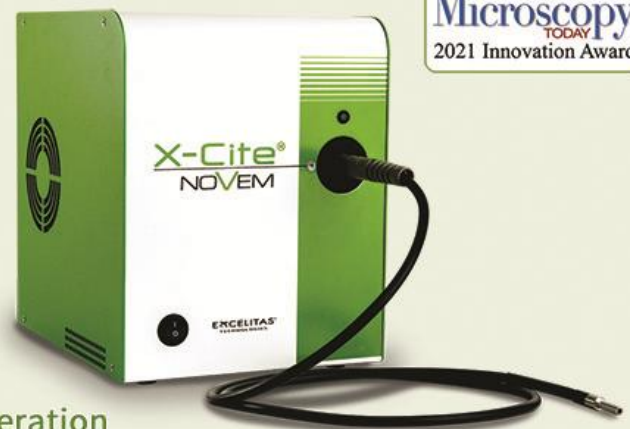
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Straightforward system integration
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Remarkable optical quality
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- IVIM Technology also provides customized service solution...

Consulting
for In Vivo Live Cell Imaging

IVM Test Imaging
as preliminary experiment

Optimization
of IVM Imaging Experimental Plan

Creating Animal Models
of Various Human Diseases

IVM Imaging
of Various Organs in Animal Models

Processing & Analysis
in Cellular Level for Reporting



Illuminating Discovery

현미경 기술을 통해
Biophotonics의
새로운 가능성을 탐구합니다.

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가 함께합니다.

Biophotonics의 최전선에서 탄생한
4가지 프리미엄 현미경 솔루션으로
연구의 효율과 완성도를 높이세요.

지금 바로 아래 QR을 스캔하여
그 기능을 확인해보세요!



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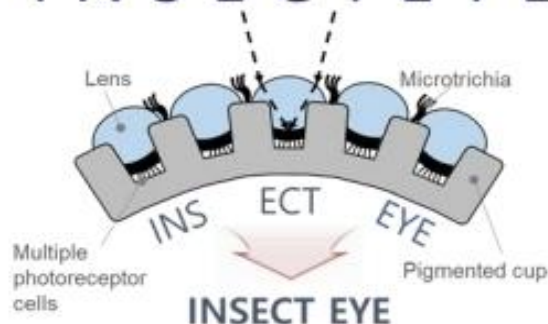


MICROPIX

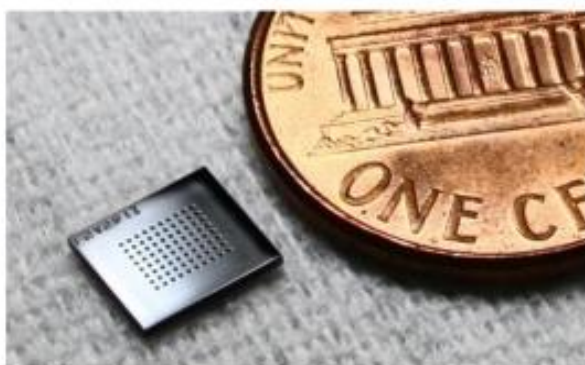
From Vision to Analysis

Ultrathin Lens Plate by inspired from Compound Eye

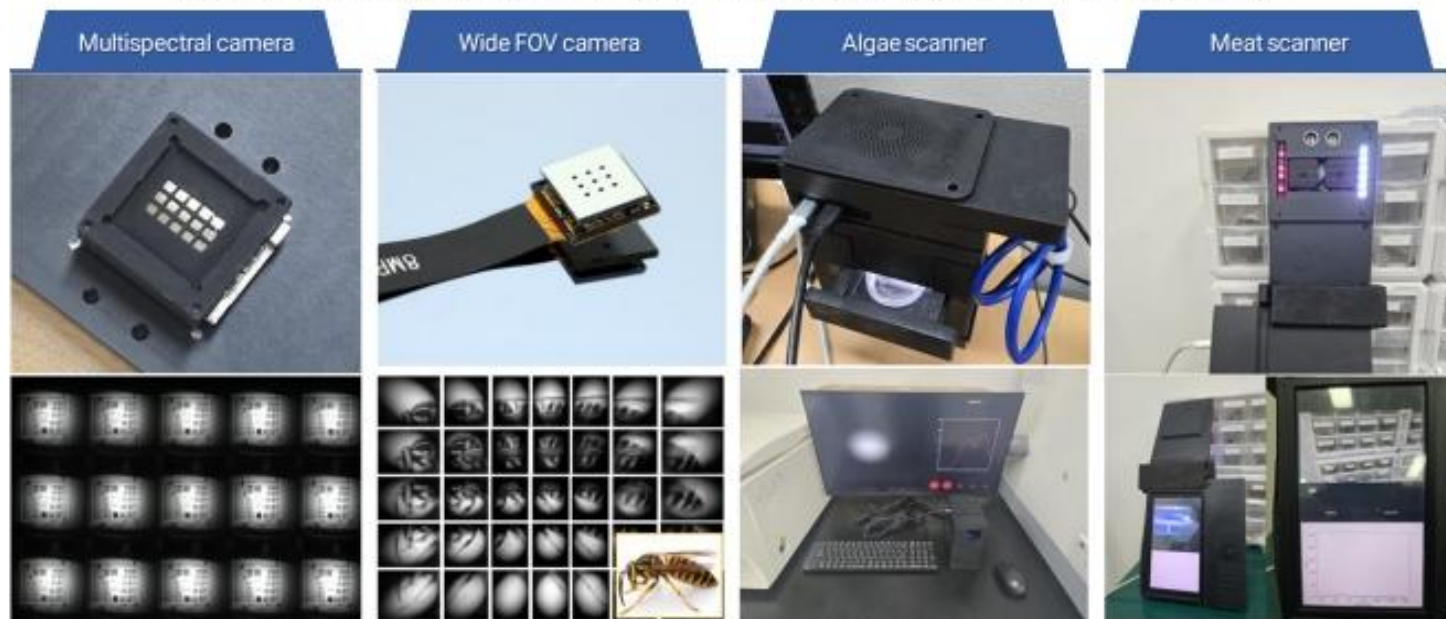
INSECT EYE



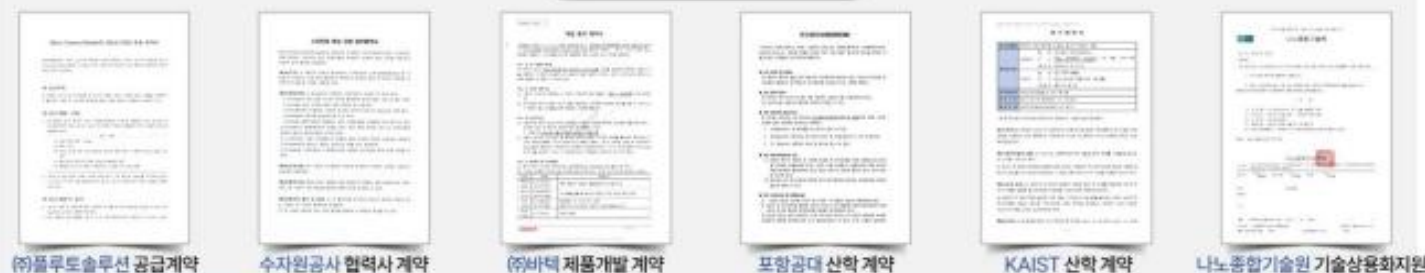
D. Keum et al. Light: Science & Applications (2018)



PoC of MLA based Camera modules & Commercialization



Collaboration Status



(주)플루토솔루션 공급계약

수자원공사 협력사 계약

(주)바텍 제품개발 계약

포항광대 산학 계약

KAIST 산학 계약

나노종합기술원 기술상용화지원

'24-25 History



2025 DOTTER HW/SW TEAM

R&D 분야 석/박사 채용



지원대상 석/박사/Post Doc. 2026년 상반기 이내 입사

모집분야	직무	주요 업무	전공계열
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	S/W 개발	진단용 AI 개발, GUI 개발	무관

근무지역 서울, 인천

전형절차 지원서 접수 > 서류 전형 > 면접 전형 > 건강 검진

지원방법 CV 또는 지원서 양식을 e-mail로 접수

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AstraTSA Multiplex IHC for Spatial Biology

Advantages of AstraTSA mIHC



SCALABILITY

Up to 8-plex staining on a single slide.



FLEXIBILITY

Freedom to select and change biomarkers and fluorescent dyes.



SUPERIORITY

Higher fluorescent signal intensity compared to conventional IF staining.

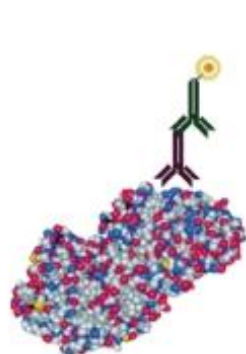


ACCURACY

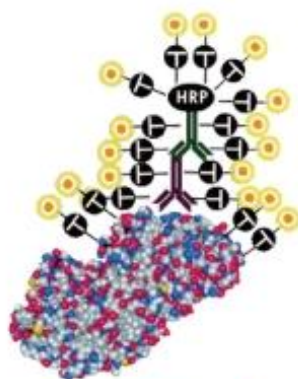
Usable with existing laboratory equipment.

Technical Features

- ✓ 10 to 100 times improved fluorescent sensitivity
- ✓ Autofluorescence removal.
- ✓ Simultaneous use of multiple markers.
- ✓ Signal amplification
- ✓ Fluorescently labeled probes can be used.



conventional

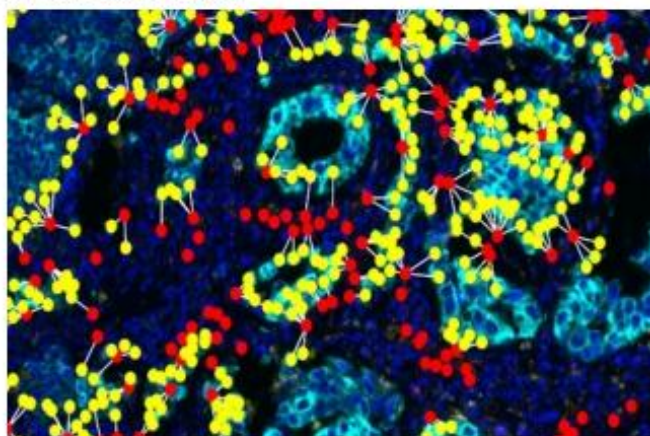


AstraTSA

Spatial Distance Analysis

AstraTSA mIHC technology is an experimental method that enables spatial distance analysis between cells and target markers through image-based spatial analysis. It calculates the distances between specified cell types and analyzes the distribution of immune cells within a specific radius around cancer cells.

- ✓ Nearest neighbor distances for phenotype pairs (microns) : Analysis of the distance between each cell and its closest neighboring cell.
- ✓ Count within (Counts) : Distribution analysis of each phenotype cell within a specified radius.

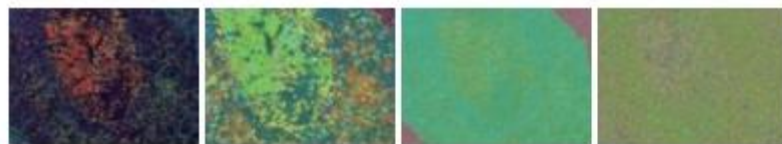


Multiplex IHC Analysis Service

The Multiplex IHC Analysis Service is a comprehensive one-stop service that integrates all processes, from antibody panel design and selection to mIHC staining and analysis. It is optimized for analyzing immune cells in tissue, such as developing companion diagnostic platforms for immunotherapy and analyzing the tissue immune profiling of the tumor microenvironment during immunotherapy administration.

Contact | serviceinfo@theranovisdx.com

NovaStain™



Spectral Unmixing

Cell Phenotyping

Tissue Segmentation

Cell Segmentation

Multispectral
imaging

Cell Interaction
Metrics

STAIN

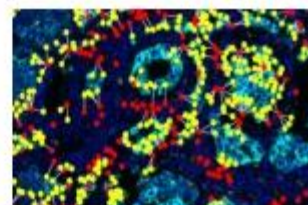
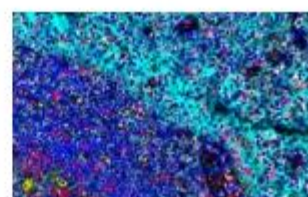
IMAGE

ANALYZE

UNDERSTAND

Multiplexed
immunohistochemistry

Image analysis



AstraTSA Multiplex IHC Panel Kits

Phenoview™ Kit	Antibodies	Astra-Dye
3-plex Multiplex IHC kit	-	Astra-520, Astra-570, Astra-650
6-plex Multiplex IHC kit	-	Astra-480, Astra-520, Astra-570, Astra-620, Astra-690, Astra-780
2-plex Macrophage panel kit	CD68, CD163	Astra-520, Astra-570
3-plex T Lymphocyte panel kit	CD4, CD8, FOXP3	Astra-520, Astra-570, Astra-650
Lymphocyte & Macrophage panel kit	CD4, CD8, FOXP3, CD20, CD68, CD163	Astra-480, Astra-520, Astra-570, Astra-620, Astra-690, Astra-780
Innate Immunity markers panel kit	CD4, CD8, FOXP3, CD20, PD-L1, CK	Astra-480, Astra-520, Astra-570, Astra-620, Astra-690, Astra-780
Adapted Immunity markers panel kit	CD68, CD163, CD11c, CD56, HLA-DR, CK	Astra-480, Astra-520, Astra-570, Astra-620, Astra-690, Astra-780
PD-1/PD-L1 markers panel kit	CD8, FOXP3, CD68, PD-1, PD-L1, CK	Astra-480, Astra-520, Astra-570, Astra-620, Astra-690, Astra-780

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Clock
Setting



Trigger
Setting
Function

Transfer
Mode



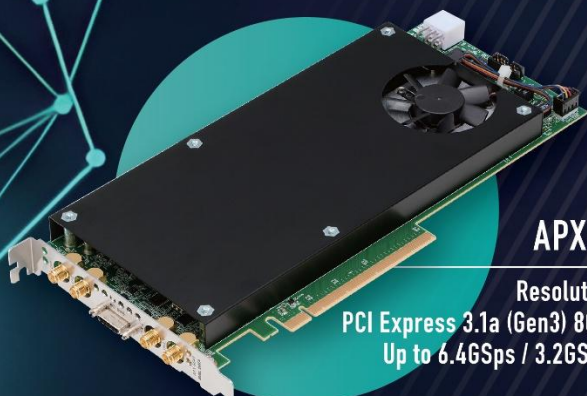
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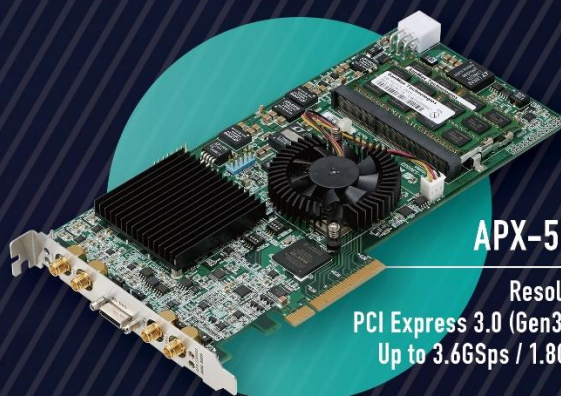
400MSPS~6.4GSPS

High Speed Sampling



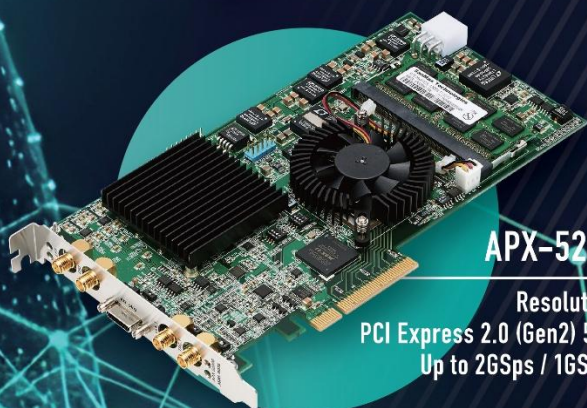
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