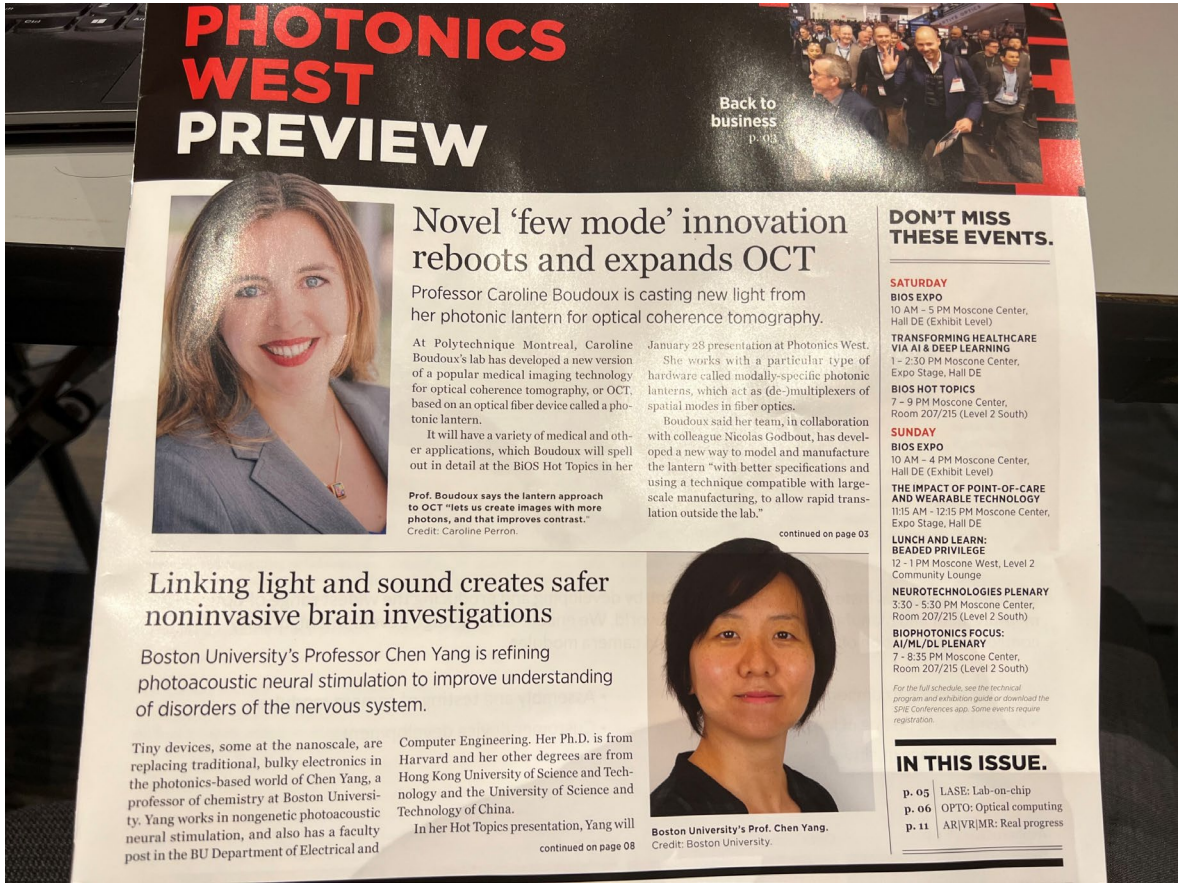
What we have achieved in 2023

Presented by Ji-Xin Cheng, 12/15/2023

Jan 2023, Photonics West



PHOTONICS WEST PREVIEW

Back to business p. 03

Novel 'few mode' innovation reboots and expands OCT

Professor Caroline Boudoux is casting new light from her photonic lantern for optical coherence tomography.

At Polytechnique Montreal, Caroline Boudoux's lab has developed a new version of a popular medical imaging technology for optical coherence tomography, or OCT, based on an optical fiber device called a photonic lantern.

It will have a variety of medical and other applications, which Boudoux will spell out in detail at the BiOS Hot Topics in her January 28 presentation at Photonics West.

She works with a particular type of hardware called modally-specific photonic lanterns, which act as (de-)multiplexers of spatial modes in fiber optics.

Boudoux said her team, in collaboration with colleague Nicolas Godbout, has developed a new way to model and manufacture the lantern "with better specifications and using a technique compatible with large-scale manufacturing, to allow rapid translation outside the lab."

Prof. Boudoux says the lantern approach to OCT "lets us create images with more photons, and that improves contrast."
Credit: Caroline Perron.

continued on page 03

Linking light and sound creates safer noninvasive brain investigations

Boston University's Professor Chen Yang is refining photoacoustic neural stimulation to improve understanding of disorders of the nervous system.

Tiny devices, some at the nanoscale, are replacing traditional, bulky electronics in the photonics-based world of Chen Yang, a professor of chemistry at Boston University. Yang works in nongenetic photoacoustic neural stimulation, and also has a faculty post in the BU Department of Electrical and Computer Engineering. Her Ph.D. is from Harvard and her other degrees are from Hong Kong University of Science and Technology and the University of Science and Technology of China.

In her Hot Topics presentation, Yang will

continued on page 08

Boston University's Prof. Chen Yang.
Credit: Boston University.

DON'T MISS THESE EVENTS.

SATURDAY

BIOS EXPO
10 AM – 5 PM Moscone Center, Hall DE (Exhibit Level)

TRANSFORMING HEALTHCARE VIA AI & DEEP LEARNING
1 – 2:30 PM Moscone Center, Expo Stage, Hall DE

BIOS HOT TOPICS
7 – 9 PM Moscone Center, Room 207/215 (Level 2 South)

SUNDAY

BIOS EXPO
10 AM – 4 PM Moscone Center, Hall DE (Exhibit Level)

THE IMPACT OF POINT-OF-CARE AND WEARABLE TECHNOLOGY
11:15 AM - 12:15 PM Moscone Center, Expo Stage, Hall DE

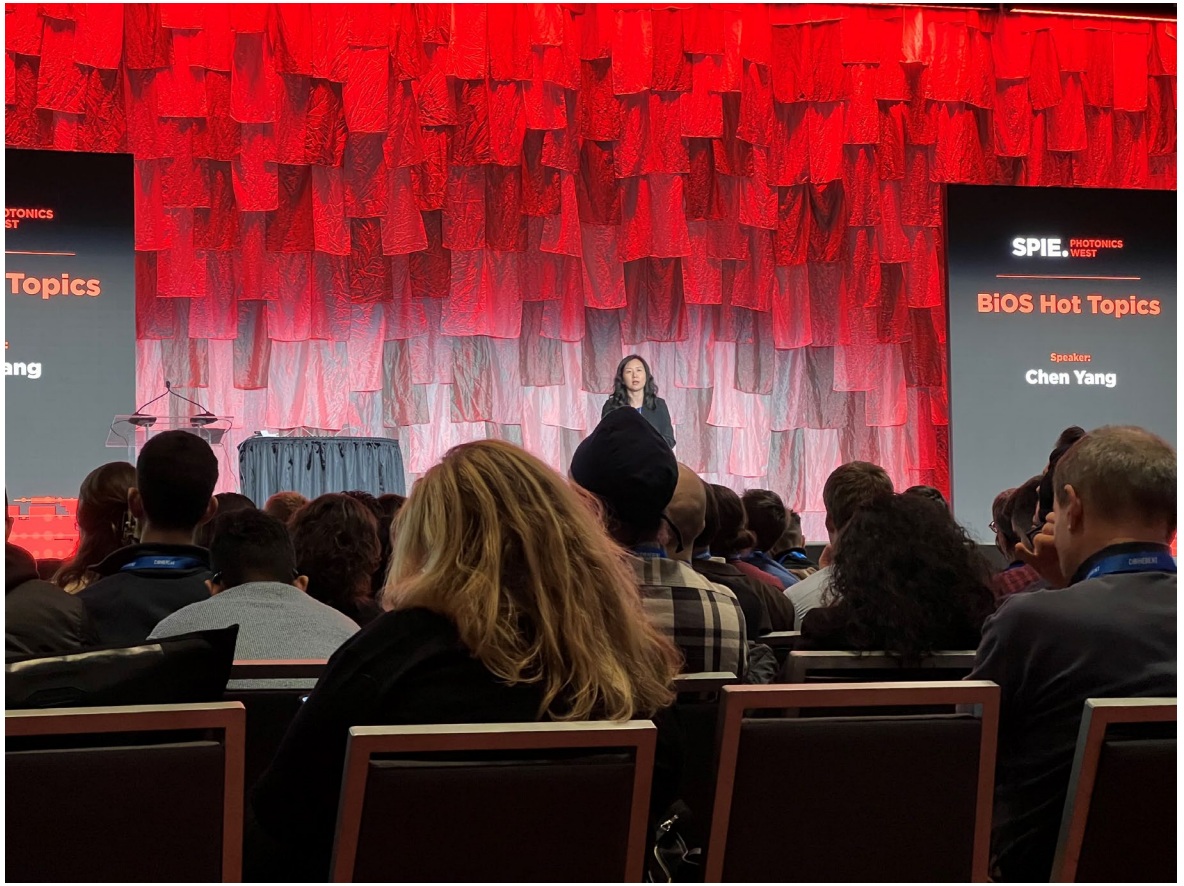
LUNCH AND LEARN: BEADED PRIVILEGE
12 - 1 PM Moscone West, Level 2 Community Lounge

NEUROTECHNOLOGIES PLENARY
3:30 - 5:30 PM Moscone Center, Room 207/215 (Level 2 South)

BIOPHOTONICS FOCUS: AI/ML/DL PLENARY
7 - 8:35 PM Moscone Center, Room 207/215 (Level 2 South)

For the full schedule, see the technical program and exhibition guide or download the SPIE Conferences app. Some events require registration.

IN THIS ISSUE.



First grant
in Jan 2023

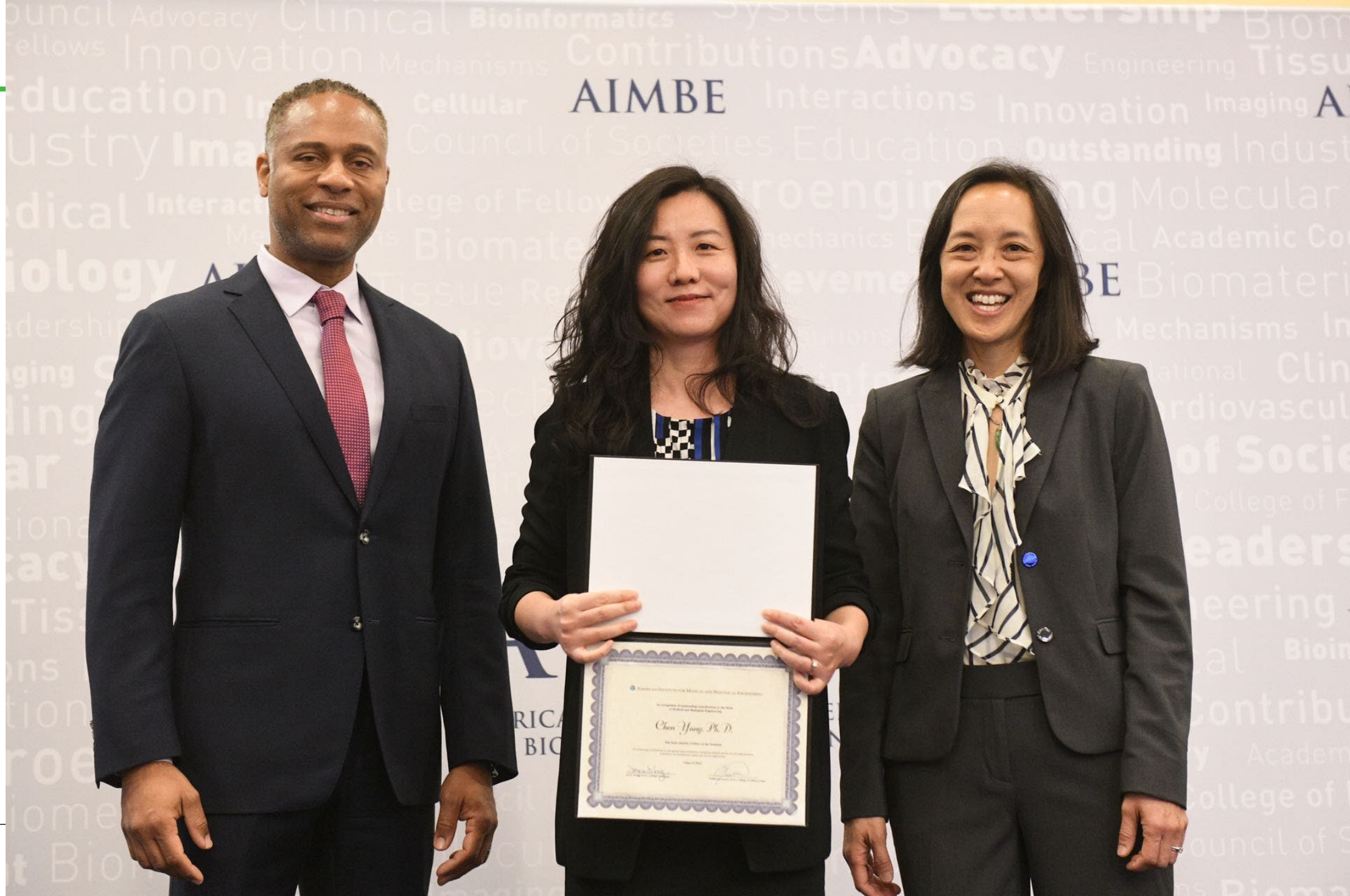
Chan Zuckerberg Initiative

Dear Ji-Xin Cheng:

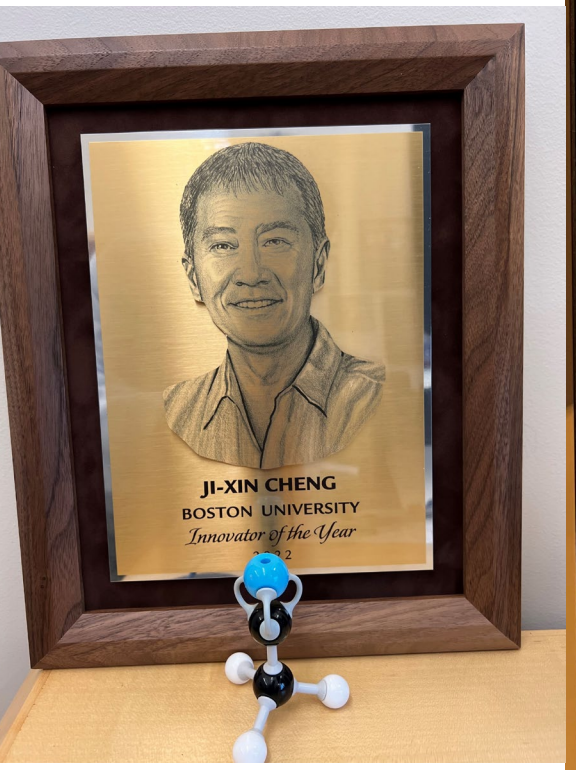
Thank you for the opportunity to review your application Dynamic-0000000094 "Bond-selective Intensity Diffraction Tomography" in response to our Request for Applications: Dynamic Imaging.

We are pleased to inform you that your application has been selected for recommendation for funding for an amount of $1,360,955 from the Chan Zuckerberg Donor Advised Fund (DAF), through the Silicon Valley Community Foundation (SVCF). SVCF will be reaching out to you in the following 4-6 weeks. Should you have any questions about this process, please contact Meagan Mnich (mmnich@chanzuckerberg.com). See below for additional information we need from you, including a formal acknowledgment of this funding notification.

March 2023



May 2023



Homepage | Boston University

bu.edu

Google Wellan Wired '20-'21 Wellan Wired '20-'2...

Boston University

ADMISSIONS ACADEMICS RESEARCH

Ji-Xin Cheng Is Innovator of the Year

Read Now

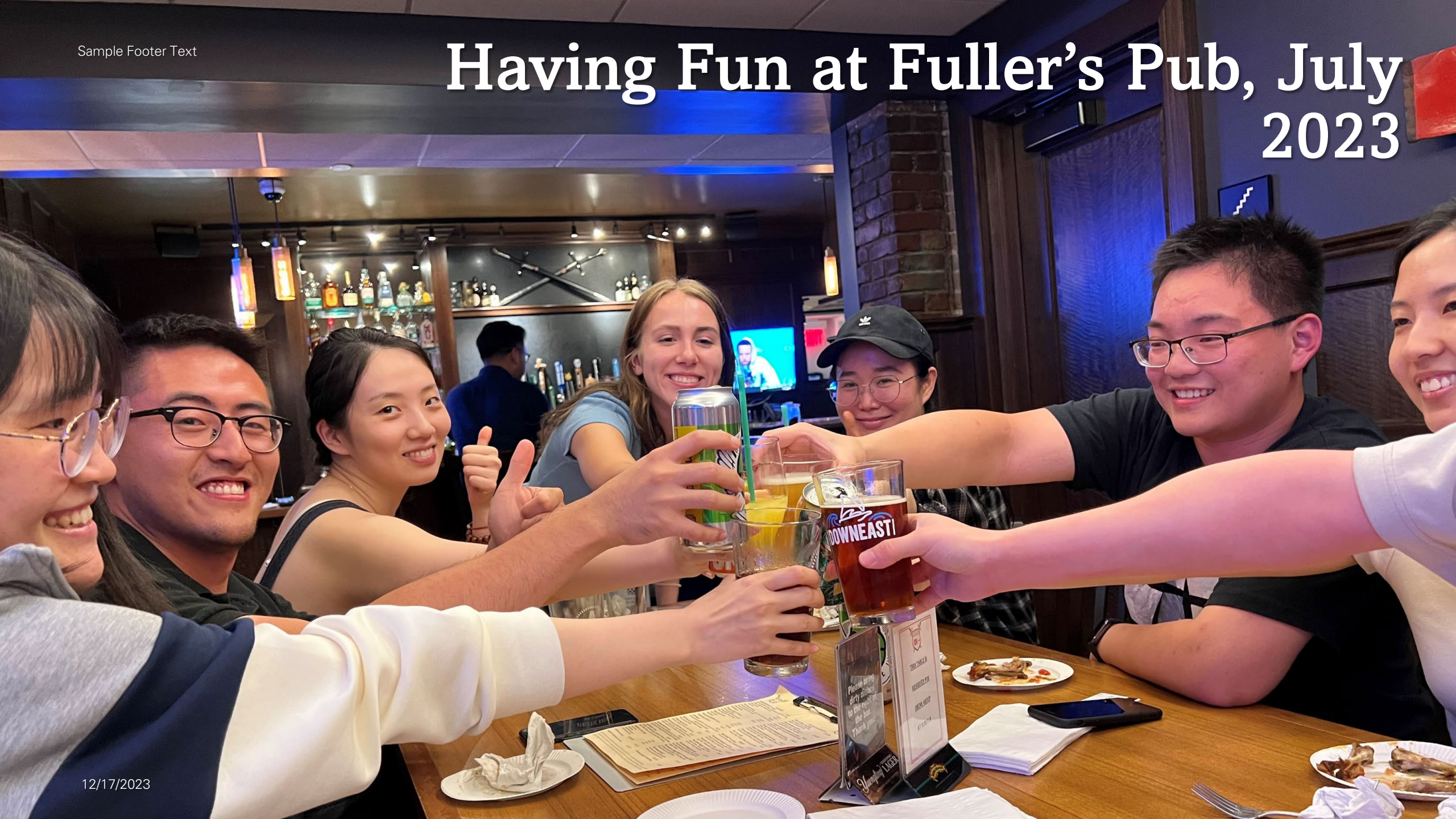
Resources for:

MyBU Student Portals Faculty Staff Parents Alumni & Friends

71°F

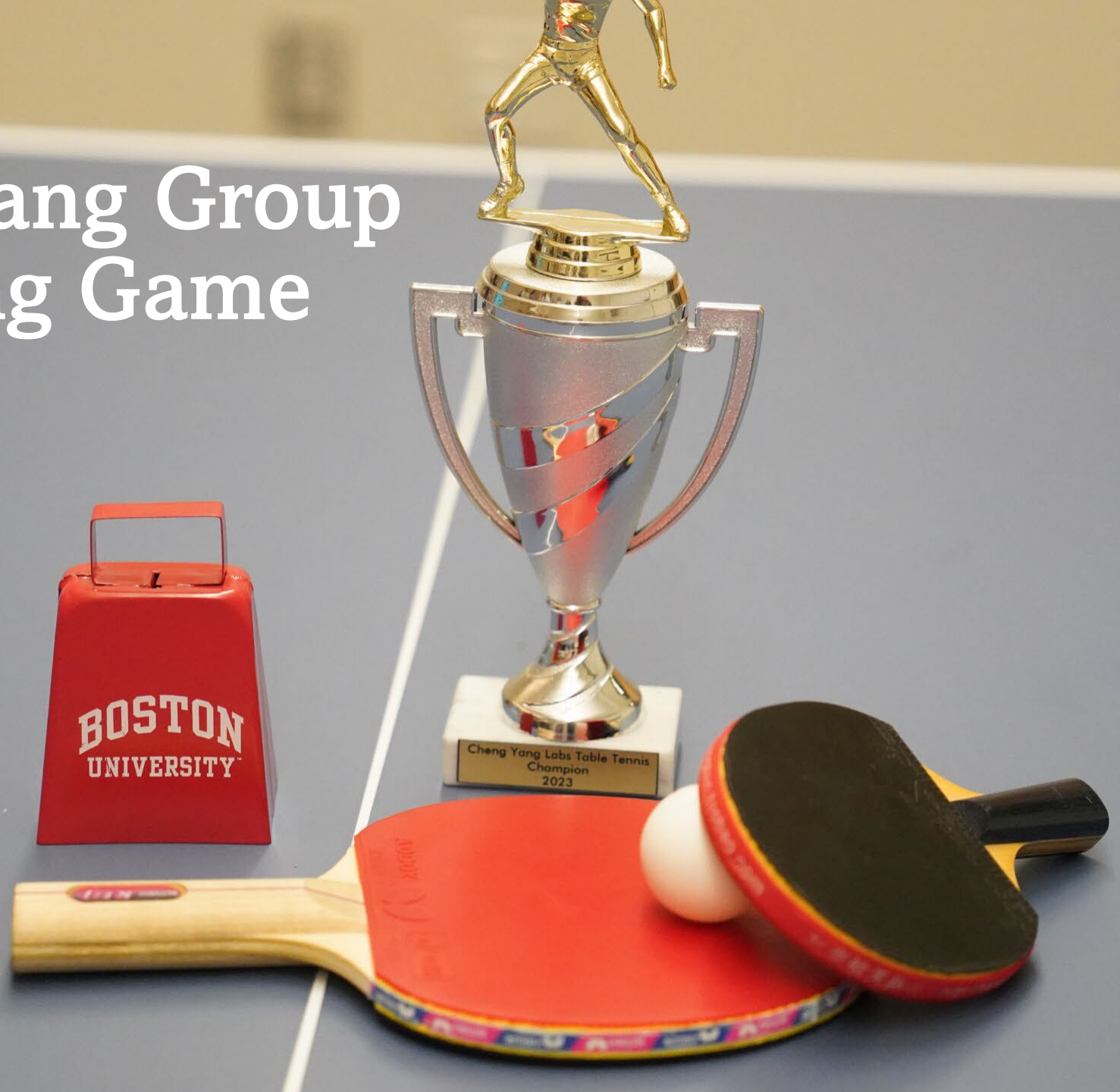
June 2023 Chemical Imaging Workshop

Having Fun at Fuller's Pub, July 2023

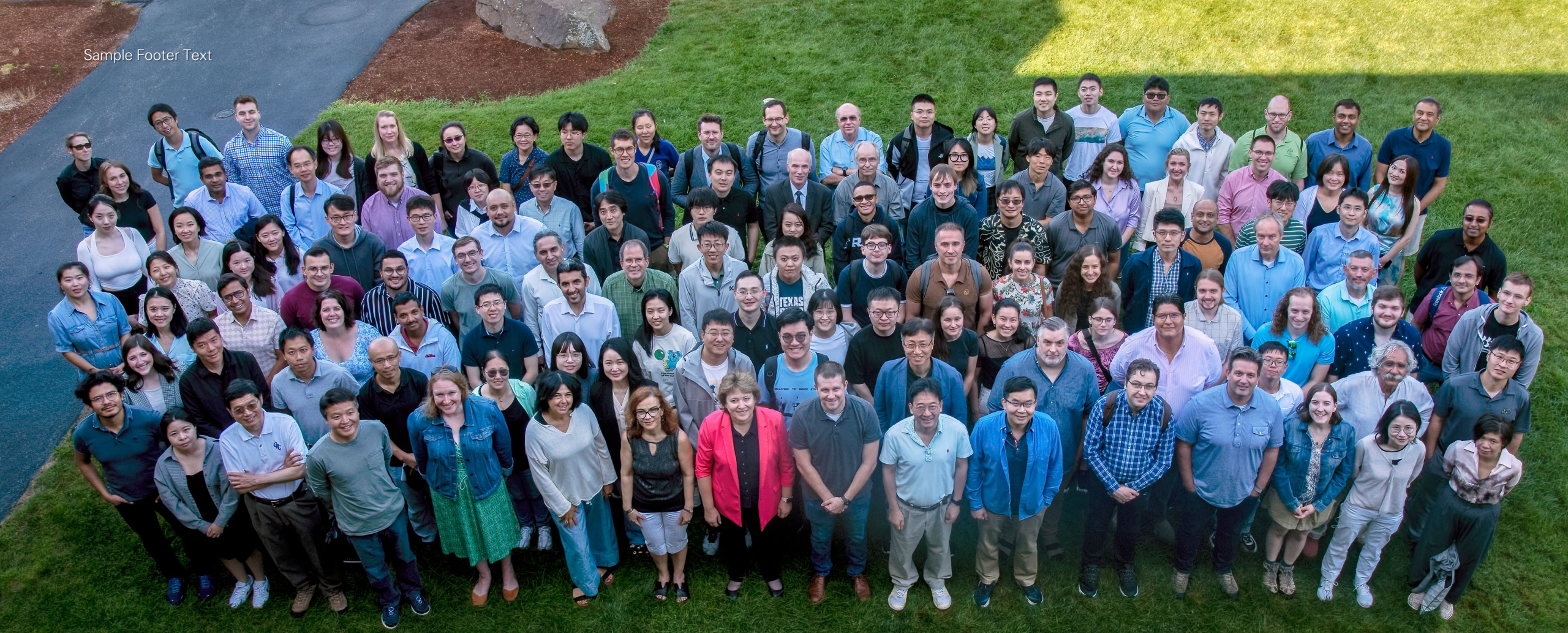


Cheng-Yang Group Ping-Pong Game

7/12/2023



Cheng & The PSC Team, Santa Barbara
July 2023



Chemical Imaging

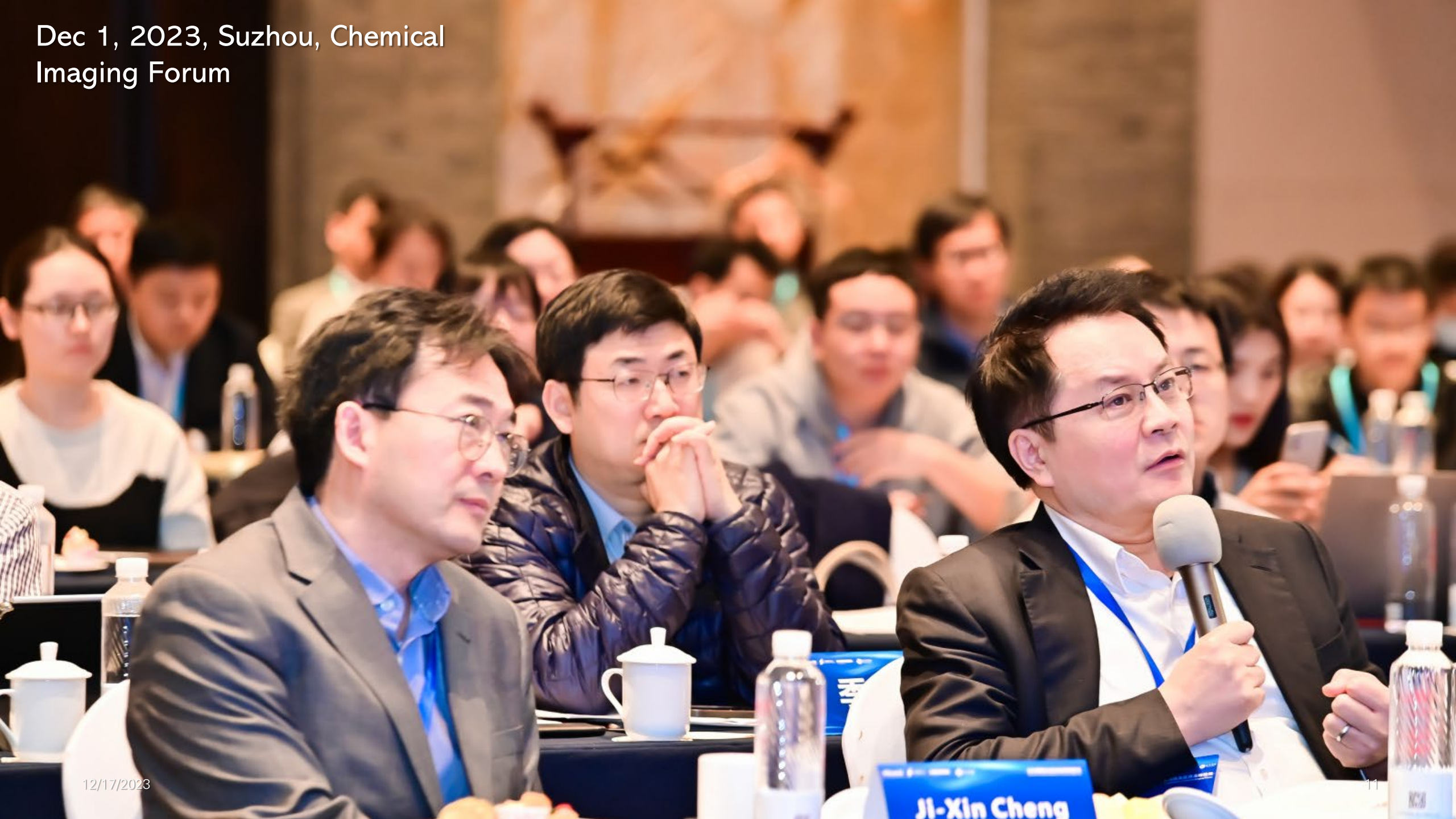
Gordon Research Conference

July 30 - August 4, 2023

Stonehill College, Easton, MA, United States

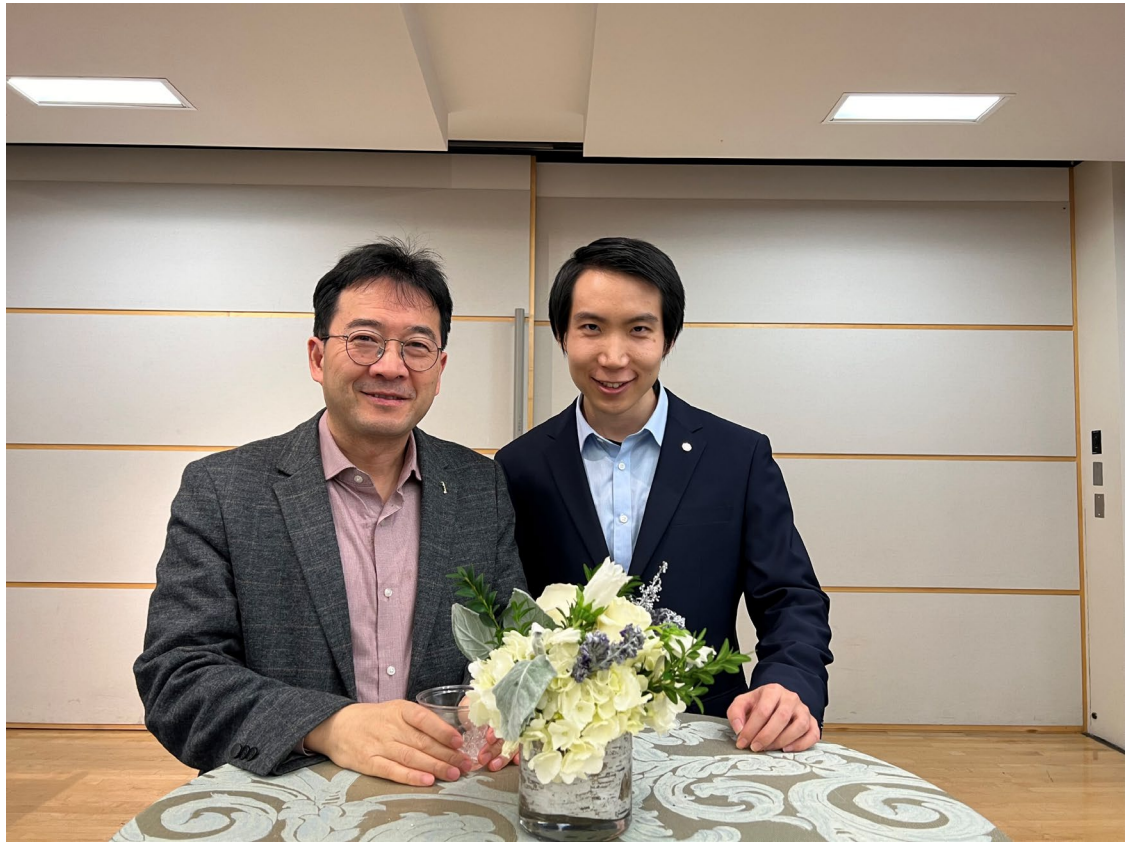
Chairs: Ji-Xin Cheng and Ning Fang

Vice Chairs: Lane Baker and Livia Eberlin


Dec 1, 2023, Suzhou, Chemical Imaging Forum
Ji-Xin Cheng

We generated 7 PhD & 2 MS in 2023!

- Yuying Tan (BME)
- Sebastian Jusuf (BME)
- Yueming Li (ME)
- Nan Zhang (MSE)
- Ran Chen (CHEM)
- Jing Zhang (BME)
- Haonan Zong (ECE)
- Mark (MS BME)
- Jiyang (MS BME)



New members joining our team

- **Jianpeng Ao (postdoc)**
- **Dashan Dong (postdoc)**
- **Stephanie Huang (Research program manager)**
- **Biwen Gao (Chemistry)**
- **Rylie Bolarinho (Chemistry)**

21 papers published or accepted in 2023

- Hongjian He, Jiaze Yin, Mingsheng Li, Xinyan Teng, Meng Zhang, Yueming Li, Zhiyi Du, Bing Xu, Ji-Xin Cheng, Mapping enzyme activity in live cells and in vivo by real-time mid-infrared photothermal imaging of nitrile chameleons, **Nature Methods, in press**
- Hongli Ni, Chinmayee Prabhu Dessai, Haonan Lin, Wei Wang, Shaoxiong Chen, Yuhao Yuan, Xiaowei Ge, Jianpeng Ao, Nolan Vild, and Ji-Xin Cheng, High-content stimulated Raman histology of human breast cancer, **Theranostics, in press**
- Vasily Astratov et al. Roadmap on label-free super-resolution imaging, **Laser and Photonics Review.**
- Haonan Zong, Celalettin Yurdakul, Jian Zhao, Zian Wang, Fukai Chen, M. Selim Ünlü, and Ji-Xin Cheng, Bond-selective Full-field Optical Coherence Tomography, **Optics Express**. 2023, 31: 41202
- Yifan Zhu, Xiaowei Ge, Hongli Ni, Jiaze Yin, Haonan Lin, Le Wang, Yuying Tan, Chinmayee V. Prabhu Dessai, Yueming Li, Xinyan Teng, Ji-Xin Cheng, Stimulated Raman photothermal microscopy towards ultrasensitive chemical imaging, **Science Advances**, 2023, 9, eadi2181.
- Qing Xia, Zhongyue Guo, Haonan Zong, Scott Seitz, Celalettin Yurdakul, Le Wang, John H. Connor, Ji-Xin Cheng, Single virus fingerprinting by wide-field defocusing-enhanced (WIDE) mid-infrared photothermal microscopy, **Nature Communications**, 2023, 14: 6655.
- Nan Zheng, Ying Jiang, Shan Jiang, Jongwoon Kim, Guo Chen, Yueming Li, Ji-Xin Cheng, Xiaoting Jia, and Chen Yang, “Multifunctional Fiber-Based Optoacoustic Emitter as a Bidirectional Brain Interface”. **Advanced Healthcare Materials**, e2300430 (2023).
- Yuying Tan, Haonan Lin, Ji-Xin Cheng. “Profiling single cancer cell metabolism via high-content SRS imaging with chemical sparsity”. **Science Advances**, 2023, 9: eadg6061.

- Sebastian Jusuf, Yuewei Zhan, Meng Zhang, Natalie J. Alexander, Adam Viens, Michael K. Mansour* and Ji-Xin Cheng*, Blue Light Deactivation of Catalase Suppresses Candida Hyphae Development Through Lipogenesis Inhibition, **Photochemistry and Photobiology,** 2023, 99, 936-946, DOI: 10.1111/php.1371
- Le Wang, Ji-Xin Cheng, Nanoscale Bond-selective Imaging by Computational Fusion of Atomic Force Microscopy and Coherent anti-Stokes Raman Scattering Microscopy, **Analyst**, 2023**, DOI: 10.1039/d3an00662j**
- Meng Zhang, Pu-Ting Dong, Hassan E. Eldesouky, Yuewei Zhan, Haonan Lin, Zian Wang, Ehab A. Salama, Sebastian Jusuf, Cheng Zong, Zhicong Chen, Mohamed N. Seleem,* and Ji-Xin Cheng*, Fingerprint Stimulated Raman Scattering Imaging Unveils Ergosteryl Ester as a Metabolic Signature of Azole Resistant Candida albicans, **Analytical Chemistry**, 2023, doi.org/10.1021/acs.analchem.3c0090
- Nathan Tague, Haonan Lin, Jean-Baptiste Lugagne, Owen M. O'Connor, Deeya Burman, Wilson W. Wong, Ji-Xin Cheng, and Mary J. Dunlop, Longitudinal Single-Cell Imaging of Engineered Strains with Stimulated Raman Scattering to Characterize Heterogeneity in Fatty Acid Production, **Advanced Science**, 2023, 2206519
- Jian Zhao, Lulu Jiang, Alex Matlock, Yihong Xu, Jiabei Zhu, Hongbo Zhu, Lei Tian, Benjamin Wolozin, Ji-Xin Cheng, Mid-infrared Chemical Imaging of Intracellular Tau Fibrils using Fluorescence-guided Computational Photothermal Microscopy **Light: Science and Applications**, 2023, 12: 147
- Jiaze Yin, Meng Zhang, Yuying Tan, Zhongyue Guo, Hongjian He, Lu Lan, Ji-Xin Cheng, Video-rate mid-infrared photothermal imaging by single pulse photothermal detection per pixel, **Science Advances**, 2023, 9: eadg8814
- Mingwei Tang, Yubing Han, Danchen Jia, Qing Yang, Ji-Xin Cheng, Far-field super-resolution chemical microscopy, **Light: Science and Applications**, review article, 2023, 12: 137

- Haonan Lin, Ji-Xin Cheng, Computational coherent Raman scattering imaging: breaking physical barriers by fusion of advanced instrumentation and data science, **elight**, review article, 2023, 3:6
- Danchen Jia, Yi Zhang, Qianwan Yang, Yujia Xue, Yuying Tan, Lei Tian, Ji-Xin Cheng, 3D Chemical Imaging by Fluorescence-detected Mid-Infrared Photothermal Fourier Light Field Microscopy, **Chemical and Biomedical Imaging**, 2023, https://doi.org/10.1021/cbmi.3c00022
- Sebastian Jusuf, Ji-Xin Cheng*, Catalase photo-deactivation improves antimicrobial efficiency of silver sulfadiazine in vitro and in vivo, **Photobiomodulation, Photomedicine, and Laser Surgery**, 2023, 41: 80-87
- Yeran Bai, Zhongyue Guo, Fátima C. Pereira, Michael Wagner, Ji-Xin Cheng, Mid-Infrared Photothermal - Fluorescence in Situ Hybridization for Functional Analysis and Genetic Identification of Single Cells, **Analytical Chemistry**, 2023, 95: 2398-2405.
- Zhongyue Guo, Yeran Bai, Meng Zhang, Lu Lan, Ji-Xin Cheng, High-Throughput Antimicrobial Susceptibility Testing of Escherichia coli by Wide-Field Mid-Infrared Photothermal Imaging of Protein Synthesis, **Analytical Chemistry**, 2023, 95, 2238-2244.
- Yuhao Yuan, Guangju Zhang, Yuqi Chen, Hongli Ni, Mingsheng Li, Michael Sturek, Ji-Xin Cheng*, A high-sensitivity high-resolution intravascular photoacoustic catheter through mode cleaning in a graded-index fiber, **Photoacoustics**, 2023, 29:100451

Grants received in 2023

NIH R01 AI141439-05A1	"Rapid AST through Metabolic Imaging at Single Cell Leve", Cheng PI	$2,484,714	07/07/2023-06/30/2027
Chan Zuckerberg Initiative	"Bond-selective Intensity Diffraction Tomography" Cheng PI	$1,360,955	3/1/2023 to 8/31/2025
NIH R21 Brain Initiative	"Massively Parallel Optoacoustic Retinal Stimulation at Micrometer-Resolutio", Yang PI	$660,000	07/01/2023-06/30/2026
Axorus	"Injectable materials for optoacoustic retinal stimulation", Yang PI	$300,000	9/1/2023 to 8/31/2024

An outlook into 2024

- Yang: promotion to full professor
- Cheng: Biophotonics Technology Innovator, speech at SPIE meeting, Jan 2024
- Nature Methods: Focused Issue on Vibrational Imaging
- New R01 grant: super-sensitive SRS
- New students, research program manager
- New PhDs, New Assistant Professors
- …