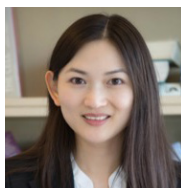


LOPS® 20244th Edition of Annual Conference on**LASERS, OPTICS, PHOTONICS,
SENSORS, BIO PHOTONICS &
ULTRAFAST NONLINEAR OPTICS****JUNE 07-10, 2024**

Metabolism is a complex biochemical process in living organisms that involves different biomolecules and consists of various reaction steps. To understand the multi-step biochemical reactions involving various components, it is essential to elucidate in-situ dynamics and the correlations between different types of biomolecules at subcellular resolution. In this context, we have developed and integrated deuterium-probed picosecond stimulated Raman scattering (DO-SRS), multiphoton fluorescence (MPF), and second harmonic generation (SHG) into a single nanoscopy system to study metabolic changes in aging and diseases.

By developing A-PoD and PRM algorithms, our current metabolic nanoscopy provides super-resolution with hyperspectral volumetric imaging capability. Combined with deuterated molecules (glucose, amino acids, fatty acids, water molecules, etc.) as probes, the metabolic heterogeneity of the brain, adipose tissue, liver, muscle, retina, kidney, lung, and ovaries (in Human, Mouse, and Drosophila tissues) is quantitatively imaged. This metabolic nanoscopy dissects the molecular events and cellular machinery in living organisms during aging and disease progression, offering new tools potentially for disease detection, diagnosis, assessing therapeutic efficacy & resistance, as well as for mechanistic understanding of scientific fundamentals in neurodegenerative diseases, cancer, drug delivery, and aging processes.

Biography

Lingyan Shi is currently an Assistant Professor in the Shu Chien-Gene Lay Department of Bioengineering at UC San Diego. Her Lab's research focuses on developing high-resolution, high-speed metabolic nanoscopy for studying aging and diseases. She discovered the "Golden Window" for deep tissue imaging and developed metabolic imaging platforms including "DO-SRS" and "STRIDE". Shi group at UC San Diego transformed SRS into a super-resolution multiplex nanoscopy using A-PoD and PRM algorithms, uncovering lipid metabolic dynamics in various organ tissues during aging processes. Dr. Shi

METABOLIC NANOSCOPY FOR STUDYING AGING AND DISEASES

Lingyan Shi

Shu Chien-Gene Lay Department of Bioengineering,
University of California San Diego
9500 Gilman Drive, #0412, La Jolla, CA 92093-0412

holds 8 awarded patents. She received the Blavatnik Regional Award for Young Scientist in 2018, the Hellman Fellowship Award in 2021-2022, the "Rising Star Award" from Nature Light Science & Applications in 2021, the "Advancing Bioimaging Scialog Fellow" by RCSA and CZI, the "David L. William Lecture & Scholarship" Award from the Kern Lipid Conference, and the "Sloan Research Fellow" Award in Chemistry in 2023, and the 2024 rising star award by BMES-Cell and Molecular Bioengineering (CMBE) society.