

BME SPECIAL SEMINAR SERIES

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“Label-free imaging pinpoints molecular markers for disease diagnosis and mechanism investigation”

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Hyeon Jeong Lee, PhD

Assistant Professor of Biomedical Engineering & Instrument Science
Zhejiang University

Abstract: Understanding the spatio-temporal dynamics of metabolites in living systems is crucial for biomedical research. Vibrational spectroscopic imaging techniques, such as stimulated Raman scattering (SRS) and mid-infrared photothermal microscopy (MIP), offer unique insights into biomolecules in their natural microenvironment. By employing a pump-probe detection scheme, these techniques provide enhanced sensitivity and spatial resolution, enabling high-speed chemical imaging for disease diagnosis and classification. Our recent work has developed a novel multimodality spectroscopic imaging method, allowing comprehensive chemical analysis in cells and tissues at submicron resolution. Furthermore, the photothermal relaxation localization (PEARL) mechanism has led to a novel super-resolution imaging technique for non-fluorescent molecules. Improved spatial and spectral resolutions enable direct localization of chemical bonds, facilitating the quantitative mapping of chemical dynamics within single cells. These technological advancements decode the molecular machinery of living systems, providing valuable insights into subcellular biomolecular dynamics.

Biography: Dr. Hyeon Jeong Lee is an Assistant Professor in the College of Biomedical Engineering & Instrument Science at Zhejiang University. She earned her B.S. in Biochemical Science and Technology from National Taiwan University and her Ph.D. in Comparative Pathobiology through the Interdisciplinary Life Science (PULSe) program at Purdue University. After that, she worked as a postdoctoral associate at Boston University Photonics Center. Her research interest centers on developing and applying biophotonics techniques for functional imaging and modulation at the subcellular level to decipher the molecular machinery of life. Her research accomplishments were recognized through multiple awards, including the Innovator Under 35 Asia Pacific by MIT Technology Review in 2021, Optica Ambassador in 2022, NSFC International Young Scientist, and Province-level award. Her work was selected as Paper of the Year and spotlight article. Hyeon Jeong is currently serving as a Chair in the Optica Molecular Probes and Nanobio-Optics technical group, a junior director in the Metabolic Biology branch of the Biophysical Society of China, and a junior committee in the Chinese Optical Society Biomedical Optics division. She is serving as a guest editor of *Frontiers in Cellular Neuroscience* and *Frontiers in Chemistry* and is invited to organize international conferences.

~ BME Hosts: Fang Huang and Young Kim ~