

Super-resolution imaging in a lumen

¹ State Key Laboratory of Extreme Photonics and Instrumentation, College of Optical Science and Engineering, Zhejiang University, Hangzhou 310027, China

²ZJU-Hangzhou Global Scientific and Technological Innovation Center, Hangzhou 311215, China

³ Research Centre for Frontier Fundamental Studies, Zhejiang Lab, Hangzhou 311121, China

⁴Collaborative Innovation Center of Extreme Optics, Shanxi University, Taiyuan, China

Qing Yang

Email: qingyang@zju.edu.cn

In this presentation, we present recent progress on in vivo super resolution imaging based on single multimode fiber. Although super-resolution imaging enables subcellular imaging and leads breakthroughs in the fields of biology and life sciences, robust in vivo nano-endoscopy is challenging. Spatial-frequency tracking adaptive beacon combined with spatial frequency engineering was proposed to ensure kHz fast tracking high stable super-resolution multimode fiber endoscopy imaging. Sub-diffraction-limited resolution about 250 nm ($\lambda/3NA$) is achieved. Multimode fiber has been integrated in a white-light endoscopy (WLE) to achieve cross-scale in vivo imaging inside the lumen. The high resolution and robust observation in a minimally invasive manner will provide an exciting new modality to endoscopy with wide applications in basic biology and clinic research.



Short Bio:

Qing Yang is a professor in the College of Optical Science and Engineering, Zhejiang University. She is the director of Research Center for Humanoid Sensing in Zhejiang Lab during 2019-2023. Qing Yang received her Bachelor and PhD degree in College of Materials Science and Engineering from Zhejiang University in 2001 and 2006, respectively. She was a visiting scholar at George Tech from 2009-2012. She was a visiting Scientist at University of Cambridge in 2018. Dr. Yang's research focuses on micro-/nanophotonic devices, super-resolution imaging and multimodal endoscopy. Totally, Dr. Yang published 90 peer reviewed journal articles and the publications have been cited by others more than 4300 times. She holds more than 40 patents. She has been invited to give talk in 70 conferences. The cross-scale dual-modal endoscopy was verified in pre-clinical experiments in Grade 3A hospitals. The

equipment got the identification of class II innovative medical devices. And highly sensitive inspection instruments have been applied to more than 20 production lines of 10 enterprises. She is the associate editor of Science Bulletin, Editorial member of Advanced Photonics, IEEE spectrum, leading guest editor of Optics Communications, editor of Journal of Nanotechnology Nanomedicine Nanobiotechnology, editor of the books Advanced Coating Materials. Yang got the NSFC Distinguished Young Scholar award. Yang's work was selected into "The Top Ten major developments in optics in China", awarded the International Advanced Materials Award and the Second Prize of National Award for Technological Invention, Wang Daheng Optical Award etc.