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## Miniature multi-photon microscopy for deep brain imaging

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Developments in miniature fluorescence microscopes have enabled visualization of brain activities and structural dynamics in animals engaging in self-determined behaviors. However, achieving deep brain imaging in freely behaving animals remains a challenge due to the optical scattering properties of brain tissue. This talk will discuss the methods for deep brain imaging with miniature two-photon and three-photon microscopes, as well as the imaging tests and brain imaging data obtained by the newly developed miniature multi-photon microscopes. The miniature two-photon microscope achieved the neuronal calcium imaging at a depth of 0.8 mm, and the miniature three-photon microscope extended the depth to 1.2 mm. In addition, the use of miniature multi-photon microscopes for multi-color imaging and large field of view imaging will also be discussed.



### **Short Bio:**

**Chunzhu Zhao** received his PhD degree in Optical Engineering from Changchun University of Science and Technology, where he was mainly engaged in lens design and multi-spectral imaging technology. After that, he completed his post-doctoral training in biophysics at Peking University, mainly studying multi-photon microscopes for brain imaging. His work has been published in *Nature Methods*, *Optics Express*, *Applied Optics* and other journals. He is now a research assistant professor at the College of Future Technology, Peking University. He was honored as one of the "Innovators Under 35" in the Asia-Pacific region by *MIT Technology Review* in 2023.