

HIGH-RESOLUTION MICROENDOSCOPY IMAGING WITH A HIGH NUMERICAL-APERTURE MICRO-LENS

Baokai Wang, Qiming Zhang, and Min Gu
Laboratory of Artificial-Intelligence Nanophotonics, School of Science
RMIT University
Melbourne, Victoria 3001, Australia
Email: baokai.wang@rmit.edu.au

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The ability to conduct high resolution fibre-optical microendoscopy imaging can make a significant impact in *in-vivo* imaging, microsurgery [1], and neuron imaging [2]. Here, we report on high resolution fibre-optical microendoscopy imaging with a high numerical aperture (NA) aberration-free free-form micro-lens on the fibre. A series of micro-lenses with NA of 0.3, 0.6 and 0.9 in air are designed to be aberration-free according to Rayleigh's quarter wavelength rule by using free-form optics. Each micro-lens is fabricated on the fibre facet by two-photon direct laser writing [3]. The microendoscopy imaging system with these micro-lenses is applied in the fluorescent imaging of samples marked by Rhodamine B. As shown in Fig. 1, the resolution and collection efficiency increase as the NA of micro-lenses increases. A resolution of 440 nm is achieved by a micro-lens with a NA of 0.9. Our result opens a new way of high resolution microendoscopy imaging in a compact size.

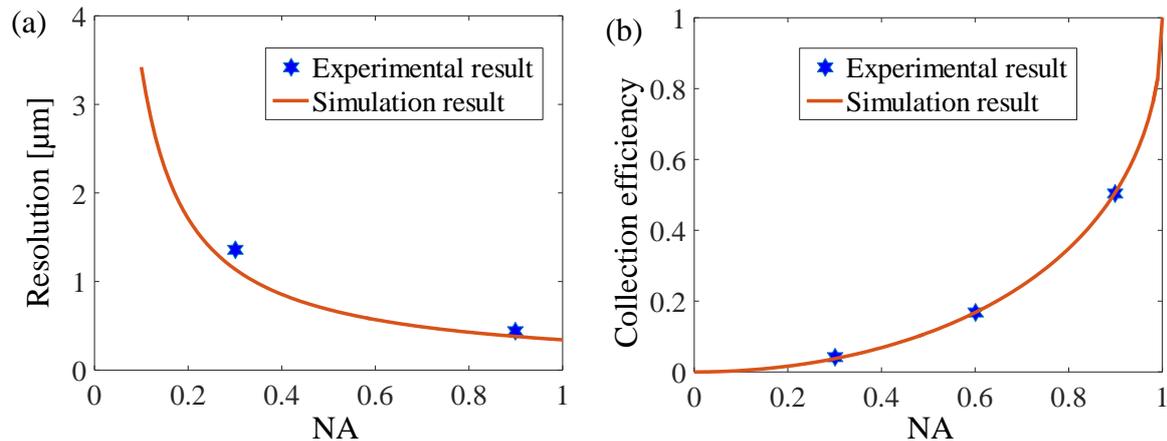


Figure 1: (a) Resolution of microendoscopy imaging with micro-lenses at different NA. (b) Collection efficiency with micro-lenses at different NA.

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