

Fiber-based Optical Manipulation

Overview: Fiber optic communications have long been of interest, but more recently the technology is being coupled with SLMs for imaging deep in tissue where scattering would otherwise prevent optical techniques from being practical. Much research is focused on imaging through multi-mode fibers due to the small form factor that minimizes damage to surrounding tissue. The challenge of imaging with multi-mode fibers is that manipulation of the fiber alters the phase error that the fiber introduces. High speed SLMs are used not only to remove the phase errors, but also to target excitation at the end of the fiber.

Critical requirements: For this market the SLM must provide high resolution, high phase stability, and high speed switching. The SLM resolution determines the ability to correct for aberrations introduced by the fiber and the ability to selectively redirect excitation after propagating through the fiber. High phase stability ensures temporally stable excitation and imaging. High speed allows for real time phase correction in as any handling of the fiber disrupts the phase of propagation.

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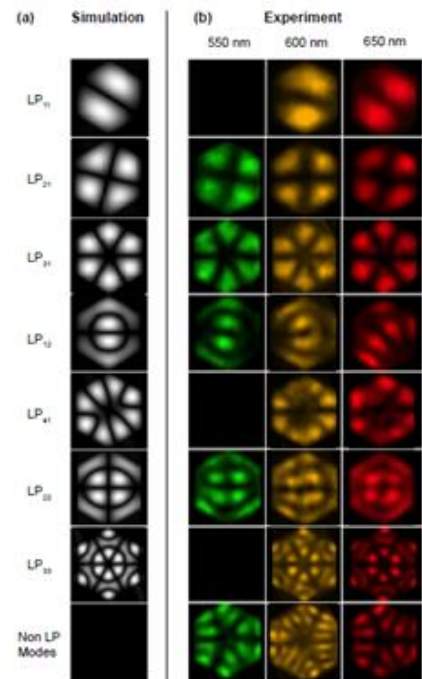


Figure 1 Ruskuc, A., Koehler, P., Weber, M. A., Andres-Arroyo, A., Frosz, M. H., Russell, P. S. J., & Euser, T. G. (2018). Excitation of higher-order modes in optofluidic photonic crystal fiber. *arXiv preprint arXiv:1807.08806*.

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