International Conference on

LASERS, OPTICS AND PHOTONICS

July 25-26, 2018 | Osaka, Japan

Multi-spectrum laser-excited phosphor light engine for endoscopic fiber illumination applications

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We develop a novel endoscopic illumination with laser-based light source, which contains two functions of multi-spectrum and dynamic light fields. How to meet the requirements of multi-spectrum, high efficiency, miniaturization, and even dynamic light field of endoscopic illumination, it is full of innovation and challenges. In this paper, we focus on the development of multi-spectral laser illumination module. We destroy the existing thinking and use innovative optical design in order to improve the system efficiency and reduce system size under Étendue constraints. We further focus on the fiber design, and evaluate the coupling efficiency, laser speckle, illumination distribution, dispersion, shading and other light qualities, to optimize the light source module. Following the above results, we also incorporate another innovative idea that we called dynamic light field for endoscopic illumination, including uniform illumination that can be enlarged/reduced and controlled spot contrast, and even the two types can be arbitrarily switch. Our design is desirable to provide a highly efficient, high-quality light and compact endoscopic illumination, can provide accurate endoscopic images, and to drive more medical and industrial endoscopy applications.

Biography

Tsung-Xian Lee received his Ph. D. in Optical Science from National Central University in Jan. 2008. Then he served as senior technical staff at Epistar Corporation in 2008-2011. In Aug. 2011, he joined the National Taiwan University of Science and Technology and served as assistant professor at the Graduate Institute of Color and Illumination Technology. His research interests are LED illumination optics, imaging and non-imaging design, lighting engineering, human factor in lighting and lighting testing and evaluation method.

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