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Biomedical fiber optics – Latest trends in high resolution imaging for medical diagnostics applications

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Abstract

Imaging and sensing technology that exploits the properties of optical fibers have taken a giant leap in the recent past with the advent of compact LEDs, diode lasers and tuneable coherent lasers as well as supercontinum light sources. Many of the devices employed series of tubes and reflecting mirrors with varying degrees of freedom to form an articulated arm during the early stages of medical diagnostics using optical concepts. Such early devices were cumbersome to use and posed many challenges. With the introduction of endoscope concepts, diagnostic and even surgical procedures have moved towards minimally invasive leading to the no-hole concepts. Such approaches for diagnostics and post operative procedures can actually reduce hospitalisation time, post –operative pain and better treatment care for clinicians. To meet this, a variety of complex methodologies or instruments and concepts have been developed by researchers by combining the properties of light with normal and specialty optical fibers for many diagnostics and sensing applications. This research presentation in this context is dedicated to these aspects of fiber optics and waveguide concepts in this challenging area of biomedical fibre optics. A detailed account of multi-modality imaging and sensing, resolution criteria and system integration and methodologies based on the recent works carried out by the author's group targeting early diagnosis of colon and breast cancers and imaging of angle closure in glaucoma patients also will be reviewed.

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Biography

Dr. Murukeshan Vadakke Matham is currently the Deputy Director of Centre for Optical & Laser Engineering (COLE), Nanyang Technological University, Singapore. He leads a research group in the areas of Biomedical Optics, Nanoscale Optics, and Applied Optics. He has published over 240 international journal and conference proceedings papers, 6 book chapters, holds 5 patents. He is the Associate Editor of (i) Journal of Medical Imaging and Health Informatics, and International Journal of Optomechatronics, and (iii) Editor–in-chief of the Journal of Holography and Speckle. He has so far given over 35 key note/plenary/invited talks at international conferences/workshops.

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