Single Channel Terahertz Endoscopic Systems

Published date: June 20, 2018

Technology description

A technique to image intrinsic contrast between abnormal and normal tissue based on the terahertz reflectivity values acquired using a continuous-wave terahertz polarization sensitive endoscope.

Background

Endoscopy is a minimally invasive diagnostic medical procedure that uses an endoscope, a medical device that consists of a long thin flexible tube, to examine the interior surfaces of an organ or tissue without surgery. Besides conventional endoscopy, computed tomography (CT), magnetic resonance imaging (MRI) and positron emission tomography (PET) are current diagnostic imaging modalities for the detection of local and distant relapse of cancers. All currently existing solutions have a number of limitations including the limited detection of small tumors, high costs, and poor resolution of tumors that are not metabolically active. A terahertz (THz) endoscope system, developed by UML researchers, can alleviate many of these limitations for the examination and detection of cancerous or precancerous regions of biological tissue.

Technology

Dr. Robert Giles and team have developed a technique to image intrinsic contrast between abnormal and normal tissue based on the terahertz reflectivity values acquired using a continuous-wave terahertz polarization sensitive endoscope.
The THz endoscope is comprised of three parts; a terahertz transceiver system to generate and detect the signal using a coherent detection technique, system optics to guide the beam as per coupling requirements, and a flexible low-loss hollow metal coated waveguide for propagating the THz beam. A single channel will transmit and collect the back reflected intrinsic THz signal from the sample, which will enable lower system costs, simpler data analysis, and fast data acquisition rates. The invention also minimizes non-sample signals and system noise from the generated images.
Market Potential
The global endoscopy equipment market was valued at $24.32 billion in 2016 and is projected to reach $34.82 billion by 2022, at a CAGR of 6.4% during the forecasted period.

Publications

https://pdfs.semanticscholar.org/bfd4/9c743ba8aa33aca62522a5a8bb1caa7111c1.pdf
https://www.osapublishing.org/oe/abstract.cfm?uri=oe-20-17-19176

Application area

Biological applications
THz endoscope
Quantitative screening for colorectal and other cancers

Advantages

Low costs
Low maintenance
Rack-mountable
Room temperature operation
High system signal-to-noise (SNR) ratio
Fully polarimetric coherent system with large dynamic range (~120-150 dB)

Institution

University of Massachusetts, Lowell

Inventors

Robert Giles
Pallavi Doradla
Cecil Joseph

联系我们

叶先生

电 话：021-65679356

手 机：13414935137

邮 箱：yeyingsheng@zf-ym.com