DEVICE AND METHOD FOR DETECTION AND CLASSIFICATION OF PATHOGENS

TECHNICAL FIELD

[0001] The present subject matter relates in general to a device and a method for detection and classification of pathogens, and in particular to a device and a method for non-invasive, automatic, in-situ detection and classification of pathogens.

BACKGROUND

[0002] Infectious diseases caused by pathogens, such as bacteria, protozoa, virus, and fungi, are generally aggravated in patients with primary diseases, such as diabetes mellitus or AIDS. Prompt identification of the causative pathogen helps in timely treatment and averting fatalities. Traditional methods of pathogen identification based on morphology and biochemical tests include cultures, DNA-based methods, and anti-body based detection. Other techniques of pathogen identification include Polymerase Chain Reaction (PCR), Raman and Fourier Transform Infrared (FTIR) spectroscopy, and the like.

SUMMARY

[0002A] In one aspect, there is provided a device for non-invasive, automatic, and in-situ detection and classification of pathogens. The device can include:

an imaging module which can include: a plurality of light sources to emit excitation radiation at a predetermined range of wavelengths; an optical switch to expose a sample comprising pathogens to the excitation radiation for a predetermined duration at a predetermined periodicity; and a detector to synchronously capture time-resolved fluorescence emission spectra, time-resolved reflectance, and time-resolved transmittance spectra at multiple spectral bands from the sample;

an image processing module, coupled to the imaging module, which can include: an image processor to perform spatial and temporal resolution of the time-resolved fluorescence emission spectra, time-resolved reflectance, and time-resolved transmittance spectra to obtain a plurality of spectral parameters; and a library database comprising a set of standard spectral parameters identifiable with reference pathogens, wherein the image processing module can be configured to compare each of the plurality of spectral parameters with the set of standard spectral parameters to detect and classify the pathogen; and

a display module (106) to display a result based on the comparison.

[0002B] In one aspect, there is provided a method for non-invasive, automatic, and in-situ detection and classification of pathogens. The method can include:

exposing a sample comprising a plurality of pathogens to an excitation radiation at a predetermined range of wavelengths from a plurality of light sources for a predetermined duration at a predetermined periodicity;

synchronously capturing, by a detector, a time-resolved fluorescence emission spectra, time-resolved reflectance, and transmittance spectra at multiple spectral bands from the sample;

performing, by an image processing module, spatial and temporal resolution of the time-resolved fluorescence emission spectra, time-resolved reflectance, and time-resolved transmittance spectra from the sample to obtain a plurality of spectral parameters;

accessing, by an image processor, a library database, wherein the library database comprises a set of standard spectral parameters associated with reference pathogens;

comparing, by the image processing module, each of the plurality of spectral parameters with the set of standard spectral parameters to detect and classify the pathogens; and

displaying, by a display module, a result based on the comparing.

BRIEF DESCRIPTION OF DRAWINGS

[0003] The detailed description is described with reference to the accompanying figures. In the figures, the left-most digit(s) of a reference number identifies the figure in which the reference number first appears. The same numbers are used throughout the drawings to reference like features and components.

[0004] Fig. 1 depicts a schematic representation of a device for detection and classification of pathogens, in accordance with an implementation of the present subject matter.

[0005] Fig. 2 depicts schematic representation of an imaging module, in accordance with an implementation of the present subject matter.