

SUMMARY

According to a first aspect, the present disclosure refers to a light detection system comprising: a first photodetector array in optical communication with a second photodetector array, wherein the first photodetector array and second photodetector array each comprise two or more photodetectors; and an optical adjustment component positioned in an optical path between the first photodetector array and the second photodetector array.

According to a second aspect, the present disclosure refers to a system comprising: a light source; and a light detection system according to the first aspect.

According to a third aspect, the present disclosure refers to a method comprising: detecting light from the flow stream with a light detection system according to the first aspect.

Examples of the present disclosure include light detection systems having two or more photodetector arrays. Systems according to certain examples include a first photodetector array in optical communication with a second photodetector array, each photodetector array having two or more photodetectors (e.g., photomultiplier tubes) and an optical adjustment component positioned in an optical path between the photodetector arrays. In some examples, the optical adjustment component is a collimator that collimates light between photodetector arrays. The optical adjustment component may include a beam splitter or a wavelength separator. An optical adjustment component may also be positioned adjacent to one or more photodetectors in the photodetector arrays. In some instances, a dichroic mirror is positioned adjacent to one or more photodetectors in the photodetector arrays. Systems may include additional photodetector arrays, such as a third photodetector array, a fourth photodetector array, a fifth photodetector array, a sixth photodetector array, a seventh photodetector array, an eighth photodetector array, a ninth photodetector array and including a tenth photodetector array. In these systems, an optical adjustment component (e.g., collimator, beam splitter, wavelength separator) may be positioned between each additional photodetector array. Systems may also include an aligner for aligning and a connector for coupling together two photodetector arrays. In examples, the subject light detection systems have a proximal end having an orifice for receiving light and a distal end. In some instances, the proximal end of the light detection system is the first photodetector array.

Examples of the present disclosure also include systems for measuring light from a sample (e.g., in a flow stream). In certain examples, systems include a light source and a light detection system that detects one or more wavelengths of light having a first photodetector array in optical communication with a second photodetector array and an optical adjustment component positioned in an optical path between the photodetector arrays. In some examples, systems also include an optical collection system for propagating light to the light detection system. The optical collection system may be a free-space light relay system or may include fiber optics such as a fiber optics light relay bundle. In some examples, the system is a flow cytometer.

Examples of the disclosure also include methods for irradiating a sample (e.g., in a flow stream) in an interrogation field with a light source, collecting and detecting light

from the sample with the subject light detection systems and measuring the detected light at one or more wavelengths. In some examples, light is collected and propagated to the light detection system by a free-space light relay system. In other examples, light is collected and propagated to the light detection system by fiber optics, such as a fiber optics light relay bundle.

In some examples, kits including one or more components of the subject light detection systems are also provided. Kits according to certain examples, include two or more photodetector arrays and an optical adjustment component for positioning in an optical path between each photodetector array. In examples, the optical adjustment component includes a collimator, beam splitter, a wavelength separator or a combination thereof. Kits may also include one or more photodetectors, such as photomultiplier tubes (e.g., metal package photomultiplier tubes).

BRIEF DESCRIPTION OF THE FIGURES

The invention may be best understood from the following detailed description when read in conjunction with the accompanying drawings. Included in the drawings are the following figures:

FIG. 1 depicts a light detection system having four photodetector arrays according to certain embodiments.

FIG. 2 depicts a light detection system along with an example optical path through the light detection system according to certain embodiments of the present disclosure.

FIG. 3 is a three dimensional depiction of a light detection system according to certain embodiments of the present disclosure.

FIG. 4 depicts a light detection system having an arrangement of photodetector arrays according to another embodiment of the present disclosure.

FIG. 5 depicts a light detection system having an arrangement of photodetector arrays according to another embodiment of the present disclosure.

DETAILED DESCRIPTION

Systems for detecting light (e.g., in a flow stream) are described. Light detection systems according to embodiments include two or more photodetector arrays and an optical adjustment component positioned in an optical path