

CLAIMS

1. A portable device which detects a Raman signal from an analyte of interest contained in or suspected to contain in a sample, the portable device comprising:
 - a laser source in optical communication with a dichroic mirror;
 - an objective lens optically positioned to consolidate the laser from the laser source to the sample;
 - (i) a pair of rotatable filters in optical communication with the dichroic mirror and an optical transmission module, or (ii) a first band-pass filter in optical communication with the dichroic mirror and an optical transmission module, wherein the first band-pass filter is tunable;
 - a rotational member operably connected to the pair of rotatable filters or the first band-pass filter; and
 - a detector optically positioned to receive and detect a Raman signal produced from the laser incident on the analyte of interest,wherein the dichroic mirror directs the laser from the laser source to the sample through the objective lens and transmits any Raman signal from the sample toward the detector,
 - wherein the dichroic mirror is optically pervious to any Raman signal having a wavelength longer than the wavelength of the laser from the laser source, and
 - wherein the detector is absent of a spectrometer and remains operable to detect the Raman signal.
2. The portable device of claim 1, wherein the detector comprises a CCD sensor, CMOS sensor, a photodiode, or a photomultiplier tube.
3. The portable device of claim 1 or 2, wherein the detector comprises a CMOS camera.
4. The portable device of any one of claims 1 to 3, wherein the laser source is a monochromatic laser source.

5. The portable device of any one of claims 1 to 4, wherein the laser from the laser source has a wavelength ranging from 400 nm to 800 nm.
6. The portable device of any one of claims 1 to 5, wherein a first collimating lens is optically positioned between the laser source and the dichroic mirror.
7. The portable device of claim 6, wherein the first collimating lens comprises a pair of collimating lens.
8. The portable device of any one of claims 1 to 7, further comprising a first fiber in optical communication with the laser source and the dichroic mirror, wherein the first fiber comprises a single mode fiber or a multi-mode fiber, which directs laser from the laser source to the dichroic mirror.
9. The portable device of claim 8, wherein a second band-pass filter is optically positioned after the first fiber and before the dichroic mirror to eliminate fluorescence generated from laser transmitting through the first fiber.
10. The portable device of any one of claims 1 to 9, wherein a notch filter is optically positioned between (i) the dichroic mirror and the pair of rotatable filters or (ii) the dichroic mirror and the first band-pass filter, to eliminate the laser from the laser source from reaching the detector through the pair of rotatable filters or the first band-pass filter.
11. The portable device of any one of claims 1 to 10, wherein each rotatable filter in the pair of rotatable filters is rotatable to have an angle defined by photons reflected from the sample incident on each of the rotatable filters and a surface of each of the rotatable filters which the photons reflected from the sample is incident on, wherein the angle renders each rotatable filter optically pervious to a range of wavelengths of the photons transmitted from the dichroic mirror to be detected by the detector so as to have the detector identify the Raman signal corresponding to the analyte of interest from the range of wavelengths of photons.

12. The portable device of claim 11, wherein each rotatable filter in the pair of rotatable filters are operably attached to one or more rotational members which control the angle and/or direction of rotation of each rotatable filter in the pair of rotatable filters.

13. The portable device of any one of claims 1 to 12, wherein a second collimating lens is in optical communication with (i) the optical transmission module and the pair of rotatable filters or (ii) the optical transmission module and the first band-pass filter.

14. The portable device of any one of claims 1 to 13, wherein the optical transmission module comprises a second fiber or a pinhole occluder to direct any Raman signal to the detector from the pair of rotatable filters or from the first band-pass filter.

15. The portable device of claim 14, wherein the second fiber comprises a multi-mode fiber.

16. The portable device of any one of claim 1 to 15, further comprising an operating module operably connected to the detector and/or (i) the pair of rotatable filters or (ii) the first band-pass filter, to generate a Raman spectrum which indicates the presence or absence of the analyte of interest.