CLAIMS

~~1. A computer-implemented method for spectroscopic identification of cancer comprising:~~
~~receiving at least one spectrum associated with a tissue;~~
~~analyzing the at least one spectrum in a model that uses the spectrum to determine a score wherein said score indicates a likelihood of the tissue being cancerous; and~~
~~outputting said score.~~

~~2. The method of claim 1 wherein said model is generated using an interpretation function selected from the group consisting of partial least squares discriminant analysis, principal component analysis linear discriminant analysis, ant colony optimization linear discriminant analysis, classification and regression trees, support vector machine, and adaptive boosting.~~

~~3. The method of claim 1 wherein said at least one spectrum is generated by Raman spectroscopy.~~

~~4. The method of claim 1 wherein said analyzing the at least one spectrum in a model comprises analyzing the at least one spectrum in a first model and a second model.~~

~~5. The method of claim 1 wherein the model is selected based on the tissue.~~

~~6. The method of claim 1 wherein the score indicates whether the tissue is normal, dysplasia or neoplasia.~~

~~7. The method of claim 1 wherein analyzing the at least one spectrum comprises:~~
~~performing outlier analysis; and~~
~~responsive to the outlier analysis determining that the at least one spectrum is an outlier, rejecting the spectrum.~~

~~8. The method of claim 7 wherein performing outlier analysis comprises principal component analysis.~~

~~9. The method of claim 7 further comprising instructing an audio emitting device to emit an audio signal responsive to the outlier analysis determining that the at least one spectrum is an outlier.~~

~~10. The method of claim 7 further comprising instructing a spectrometer to obtain at least one additional spectrum responsive to the outlier analysis determining that the at least one spectrum is an outlier and receiving the at least one additional spectrum.~~

~~11. The method of claim 6 further comprising instructing an audio emitting device to emit an audio signal identifying the tissue as normal, dysplasia or neoplasia.~~

~~12. The method of claim 6 wherein the audio signal associated with each of normal, dysplasia or neoplasia is different.~~

~~13. The method of claim 12 wherein the audio signal associated with each of normal, dysplasia or neoplasia is also different from an audio signal associated with an outlier spectrum.~~

~~14~~1. A method of calibrating a fiber-optic Raman spectroscope system, the system comprising a laser source, a spectroscope and a fiber optic probe to transmit light from the laser source to a target and return scattered light to the spectroscope, the method comprising:
transmitting light from the laser source to a standard target having a known spectrum;~~,~~
recording a calibration spectrum of the scattered light from the standard target;~~,~~ and
comparing the known spectrum and the calibration system and generating a transfer function, and storing the transfer function.

~~15~~2. ~~A~~The method according to claim ~~14~~1 comprising recording calibration spectra for each of a plurality of fiber optic probes, calculating a transfer function for the system including each of said probes, and associating the transfer function with the corresponding probe.

~~16~~3. ~~A~~The method according to claim ~~14~~1 or claim ~~15~~1 comprising the steps of subsequently illuminating a test subject, recording a spectrum and correcting the spectrum in accordance with the stored transfer function.

~~17~~4. ~~A~~The method according to any one of claims ~~14- 16~~1 - 3 wherein the spectrometer has an associated spectrometer transfer function and the probe has an associated probe transfer function, and the transfer function is a function of the spectrometer transfer function and the probe transfer function.

~~18~~5. ~~A~~The method according to any one of claims ~~14- 17~~1 - 4 comprising, on a primary spectrometer system, calculating a first transfer function with a primary fiber optic probe, and a second transfer function with a secondary fiber optic probe, and calculating a calibration function based on the first-transfer function and second transfer function.

~~19~~6. ~~A~~The method according to claim ~~18~~5 comprising associating the calibration function with the secondary fiber optic probe.

~~20~~7. ~~A~~The method according to claim ~~18~~5 or claim ~~19~~6 comprising, on a secondary spectrometer system, using the primary fiber optic probe and generating a secondary system transfer function and storing the secondary system transfer function.

~~21~~8. ~~A~~The method according to claim ~~20~~7 comprising using the secondary fiber optic probe with the secondary spectrometer system and modifying the stored secondary system transfer function in accordance with the calibration function.

~~22~~9. ~~A~~The method according to any one of claims ~~18 to 21~~5 - 8 comprising the initial step of performing a wavelength-axis calibration of the secondary spectrometer system in accordance with the primary spectrometer system.

~~23~~10. A method of operating a Raman spectroscope system, the system comprising a laser source, a spectroscope and a fiber optic probe to transmit light from the laser source to a target and return scattered light to the spectroscope,

the method comprising:

transmitting light from the laser source to a target having a known spectrum;,

recording a spectrum of the scattered light from the target;, and

modifying the recorded spectrum in accordance with a stored transfer function.

2411. AThe method according to claim 2310 wherein the stored transfer function corresponds to the spectrometer and the fiber optic probe.

2512. AThe method according to claim 2310 wherein the stored transfer function corresponds to the spectrometer and a primary fiber optic probe and the method further comprises modifying the stored transfer function in accordance with a stored calibration function associated with the fiber optic probe.

2613. A Raman spectroscope system comprising a laser source, a spectroscope and a fiber optic probe to transmit light from the laser source to a target and return scattered light to the spectroscope, and a stored transfer function, the system being operable to transmit light from the laser source to a target having a known spectrum, record a spectrum of the scattered light from the target, and modify the recorded spectrum in accordance with the stored transfer function.

2714. AThe system according to claim 2613 wherein the stored transfer function corresponds to the spectrometer and the fiber optic probe.

2815. AThe system according to claim 2613 wherein the stored transfer function corresponds to the spectrometer and a primary fiber optic probe and the method further comprises modifying the stored transfer function in accordance with a stored calibration function associated with the fiber optic probe.

29 A method of estimating the laser power transmitted in a fiber-optic Raman spectrometer system, the system comprising a laser source, a spectroscope and a fiber optic probe to transmit light from the laser source to a target and return scattered light to the spectroscope, the method comprising transmitting light from the laser source to a plurality of targets, for

each test target, measuring the transmitted power of the light from the laser source and the spectrum of the scattered light at the spectroscope, performing a multivariate analysis of the captured spectra with the measured transmitted power as a dependent variable, and storing a resulting model.

30. A method according to claim 29 comprising the step of transmitting laser light to a test target, supplying a captured spectrum to the model, and calculating an estimate of the transmitted power.

31. A method of subtracting a background signal from a fiber-optic Raman spectroscope system having a fiber-optic probe, the method comprising the steps of;
a) storing a background spectrum,
b) receiving a test spectrum,
c) estimating a background contribution using one or more reference peaks,
d) multiplying the background spectrum by a correction factor based on the estimated background contribution and subtracting it from the test spectrum,
e) checking the test spectrum for a remaining background contribution, and
f) if the background contribution is negligible, outputting the test spectrum, otherwise repeating steps (c) to (e).

32. A method according to claim 31 where the one or more reference peaks comprise one or more peaks corresponding to silica or sapphire in the fiber-optic probe.

33. The calibration method of any one of claims 14 to 18 followed by the method of any one of claims 1 to 13.