CLAIMS

[Claim 1]

A monitor that monitors a state of an organism internal part from a surface of the organism, comprising:

a probe including an observation window attached to the surface of the organism;

a unit that emits a laser onto at least part of an observation region on the surface of the organism accessed via the observation window;

a unit that detects scattered light caused by emission of the laser from each of a plurality of observation spots that are either intermittently dispersed in two dimensions in the observation region or are continuously formed so as to scan the observation region;

a unit that limits, based on the scattered light obtained from the plurality of observation spots, from the plurality of observation spots to first observation spots where it is evaluated that scattered light including information on a target part of the organism internal part is obtained, forms a profile in a depth direction for the first observation spots, and forms a three-dimensional profile of the target part; and

a unit that acquires spectra of at least one component from the first observation spots or peripheries of the first

observation spots related to the three-dimensional profile of the target part and outputs first information showing the state of the target part of the organism internal part based on intensities of the spectra.

[Claim 2]

The monitor according to claim 1,

further comprising a unit that acquires spectra of a first component for a plurality of parts at different depths from the surface of the organism at the first observation spots or the peripheries of the first observation spots and further limits or updates the first observation spots based on the intensity of the spectra of the first component.

[Claim 3]

The monitor according to claim 1 or 2,

wherein the probe includes an output unit that guides the laser from the unit that emits to each of the plurality of spots selectively.

[Claim 4]

The monitor according to any of claim 1 to 3,

wherein the probe includes an input unit that guides scattered light from each of the plurality of observation spots to the unit that detects.

[Claim 5]

The monitor according to any of claim 1 to 4,

wherein the plurality of observation spots are set at intervals of 1 to 1000μm in the observation region.

[Claim 6]

The monitor according to any of claim 1 to 4,

wherein the plurality of observation spots are set at intervals of 10 to 100μm in the observation region.

[Claim 7]

The monitor according to any of claim 1 to 6,

wherein the probe tightly attaches the observation window to the surface of the organism via a diffusive porous membrane.

[Claim 8]

A system comprising:

a monitor according to any of claim 1 to 7; and

a delivery unit that provides a physiologically active substance to the organism based on the first information.

[Claim 9]

A system according to claim 8 further comprising:

a behavior monitoring unit that acquires or predicts an external state of the organism; and

a unit that controls an amount or type of physiologically active substance provided to the organism from the delivery unit according to information from the behavior monitoring unit in addition to the first information.

[Claim 10]

The system according to claim 8 or 9, further comprising a unit that outputs the first information and an operating state of the delivery unit to outside.

[Claim 11]

A control method for a system including a monitor that monitors a state of an organism internal part from a surface of the organism,

the monitor including:

a probe including an observation window attached to the surface of the organism;

a unit that emits a laser onto at least part of an observation region on the surface of the organism accessed via the observation window; and

a unit that detects scattered light caused by emission of the laser from each of a plurality of observation spots that are either intermittently dispersed in two dimensions in

the observation region or are continuously formed so as to scan the observation region;

wherein the method comprises:

limiting, based on the scattered light obtained from the plurality of observation spots, from the plurality of observation spots to first observation spots where it is evaluated that scattered light including information on a target part of the organism internal part is obtained, forming a profile in a depth direction for the first observation spots, and forming a three-dimensional profile of the target part; and

acquiring spectra of at least one component from the first observation spots or peripheries of the first observation spots related to the three-dimensional profile of the target part and outputting first information showing the state of the target part of the organism internal part based on intensities of the spectra.

[Claim 12]

The method according to claim 11,

further comprising acquiring spectra of a first component for a plurality of parts at different depths from the surface of the organism at the first observation spots or the peripheries of the first observation spots and further limiting or updating the first observation spots based on the

intensity of the spectra of the first component.

[Claim 13]

The method according to claim 11 or 12,

wherein the system further includes a delivery unit that provides a physiologically active substance to the organism based on the first information,

and the method further comprises selecting a physiologically active substance and an amount to be delivered by the delivery unit based on the first information.

[Claim 14]

The method according to claim 13,

wherein the system further includes a behavior monitoring unit that acquires or predicts an external state of the organism; and

the selecting includes selecting the amount or type of physiologically active substance delivered by the delivery unit based on information on the external state in addition to the first information.

[Claim 15]

The monitor according to claim 1,

wherein the unit that outputs the first information includes a spatially offset coherent anti-Stokes Raman

spectroscopy unit that emits Stokes light or pump light so as to intersect at a depth set according to a three-dimensional profile of the target part.

[Claim 16]

The monitor according to claim 1 or 15,

wherein the target part is a blood vessel, and the unit that forms the three-dimensional profile includes a unit that determines whether blood flow is present from Doppler effect components included in the scattered light and forms a three-dimensional profile of a blood vessel.

[Claim 17]

The method according to claim 11,

wherein the outputting of the first information includes emitting Stokes light or pump light so as to intersect at a depth set according to a three-dimensional profile of the target part.

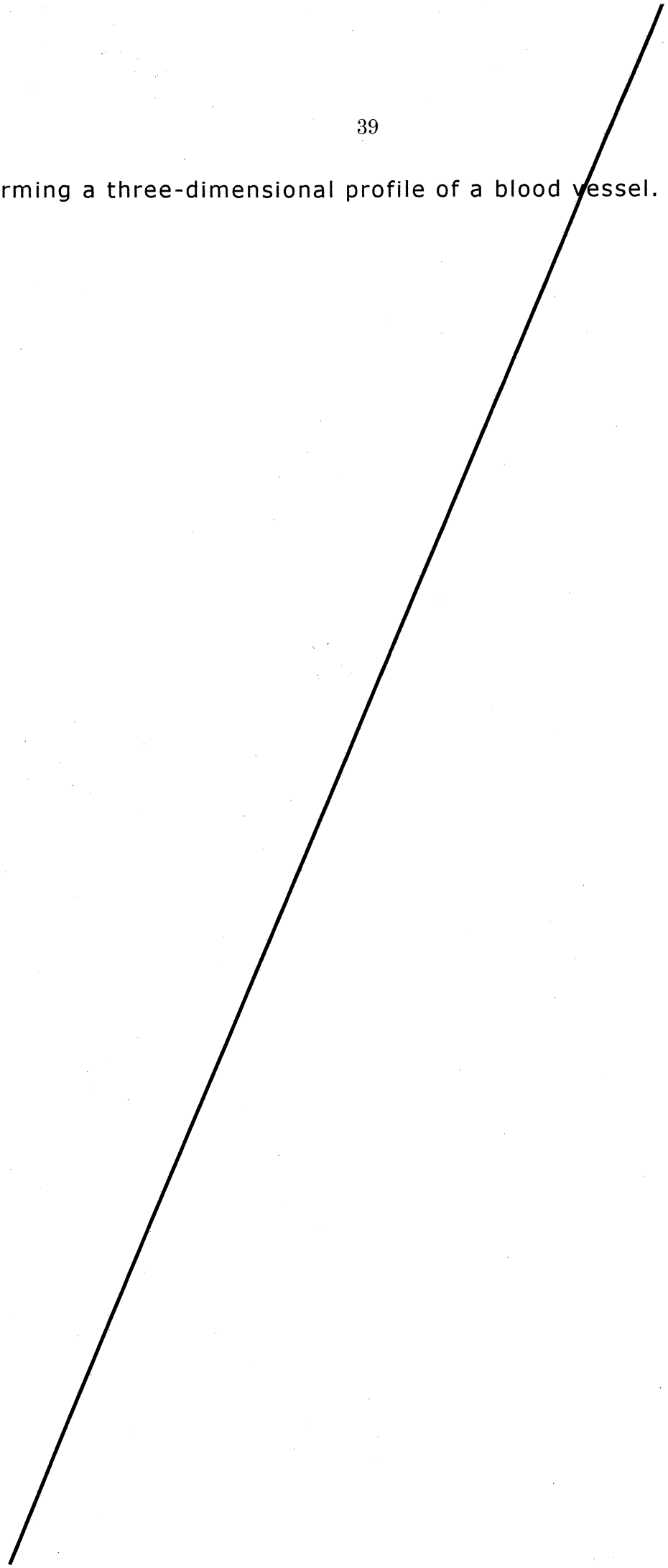
[Claim 18]

The method according to claim 11 or 17,

wherein the target part is a blood vessel, and

the forming of the three-dimensional profile includes determining whether blood flow is present from Doppler effect components included in the scattered light and

forming a three-dimensional profile of a blood vessel.



CLAIMS

[Claim 1]

A monitor that monitors a state of an organism internal part from a surface of the organism, comprising:

a probe including an observation window attached to the surface of the organism;

a unit that emits a laser onto at least part of an observation region on the surface of the organism accessed via the observation window;

a unit that detects scattered light caused by emission of the laser from each of a plurality of observation spots that are either intermittently dispersed in two dimensions in the observation region or are continuously formed so as to scan the observation region;

a unit that limits, based on the scattered light obtained from the plurality of observation spots, from the plurality of observation spots to first observation spots where it is evaluated that scattered light including information on a target part of the organism internal part is obtained; and

a unit that acquires spectra of at least one component from the first observation spots or peripheries of the first observation spots and outputs first information showing the state of the organism internal part based on intensities of the spectra

wherein the probe includes an output unit that guides the laser from the unit that emits to each of the plurality of spots selectively.

[Claim 2]

The monitor according to claim 1,

further comprising a unit that acquires spectra of a first component for a plurality of parts at different depths from the surface of the organism at the first observation spots or the peripheries of the

first observation spots and further limits or updates the first observation spots based on the intensity of the spectra of the first component.

[Claim 3]

The monitor according to claim 1 or 2,

wherein the probe includes an input unit that guides scattered light from each of the plurality of observation spots to the unit that detects.

[Claim 4]

The monitor according to any of claim 1 to 3,

wherein the plurality of observation spots are set at intervals of 1 to 1000μm in the observation region.

[Claim 5]

The monitor according to any of claim 1 to 3,

wherein the plurality of observation spots are set at intervals of 10 to 100μm in the observation region.

[Claim 6]

The monitor according to any of claim 1 to 5,

wherein the probe tightly attaches the observation window to the surface of the organism via a diffusive porous membrane.

[Claim 7]

A system comprising:

a monitor according to any of claim 1 to 6; and

a delivery unit that provides a physiologically active substance to the organism based on the first information.

[Claim 8]

The system according to claim 7 further comprising:

a behavior monitoring unit that acquires or predicts an external state of the organism; and

a unit that controls an amount or type of physiologically active substance provided to the organism from the delivery unit according to information from the behavior monitoring unit in addition to the first information.

[Claim 9]

The system according to claim 7 or 8, further comprising a unit that outputs the first information and an operating state of the delivery unit to outside.

[Claim 10]

A control method for a system including a monitor that monitors a state of an organism internal part from a surface of the organism,

the monitor including:

a probe including an observation window attached to the surface of the organism;

a unit that emits a laser onto at least part of an observation region on the surface of the organism accessed via the observation window; and

a unit that detects scattered light caused by emission of the laser from each of a plurality of observation spots that are either intermittently dispersed in two dimensions in the observation region or are continuously formed so as to scan the observation region;

wherein the probe includes an output unit that guides the laser from the unit that emits to each of the plurality of spots selectively,

wherein the method comprises:

limiting, based on the scattered light obtained from the plurality of observation spots, from the plurality of observation spots to first observation spots where it is evaluated that scattered light including information on a target part of the organism internal part is obtained; and

acquiring spectra of at least one component from the first observation spots or peripheries of the first observation spots and outputting first information showing the state of the organism internal part based on intensities of the spectra.

[Claim 11]

The method according to claim 10,

further comprising acquiring spectra of a first component for a plurality of parts at different depths from the surface of the organism at the first observation spots or the peripheries of the first observation spots and further limiting or updating the first observation spots based on the intensity of the spectra of the first component.

[Claim 12]

The method according to claim 10 or 11,

wherein the system further includes a delivery unit that provides a physiologically active substance to the organism based on the first information,

and the method further comprises selecting a physiologically active substance and an amount to be delivered by the delivery unit based on the first information.

[Claim 13]

The method according to claim 12,

wherein the system further includes a behavior monitoring unit that acquires or predicts an external state of the organism; and

the selecting includes selecting the amount or type of physiologically active substance delivered by the delivery unit based on information on the external state in addition to the first information.