CLAIMS

The invention claimed is:

1. A system, comprising:

a flow path containing a fluid;

a fluid separator coupled to the flow path and having an inlet for receiving the fluid and a discharge conduit for discharging the fluid after having undergone a separation process in the fluid separator;

a first optical computing device arranged adjacent the inlet and having a first integrated computational element configured to optically interact with the fluid and thereby produce and convey optically interacted light to a first detector which generates a first output signal corresponding to a characteristic of the fluid before the fluid enters the fluid separator;

a second optical computing device arranged adjacent the discharge conduit and having a second integrated computational element configured to optically interact with the fluid and thereby produce and convey optically interacted light to a second detector which generates a second output signal corresponding to the characteristic of the fluid after the fluid exits the fluid separator; and

a signal processor communicably coupled to the first and second detectors and configured to receive the first and second output signals and provide a resulting output signal.

2. The system of claim 1, wherein the resulting output signal is indicative of how the characteristic of the fluid changes between the inlet and the discharge conduit.

3. The system of any of the preceding claims, wherein the characteristic of the fluid is a concentration of a substance in the fluid.

4. The system of claim 3, wherein the substance comprises a substance selected from the group consisting of a hydrocarbon, a sulfur-containing gases, carbon dioxide, sand, and particulates.

5. The system of any of the preceding claims, wherein the characteristic of the fluid is one or more chemicals or chemical compositions present in the fluid.

6. The system of claim 5, wherein the characteristic comprises a chemical or chemical composition selected from the group consisting of salts, precipitates, water, chemical tags, physical tags, metals, organic compounds, volatile organic compounds, additives, treatments, polymers, drugs, medicines, poisons, emulsion breakers, digester organisms, de-foaming agents, coalescing agents, flocculants, and any derivatives or combinations thereof.

7. The system of any of the preceding claims, wherein the characteristic of the fluid is a concentration of a biological organism.

8. The system of any of the preceding claims, wherein the resulting output signal is a concentration of the characteristic of interest as measured by the second optical computing device.

9. The system of claim 8, wherein the resulting output signal is used as a quality control measure for the fluid.

10. The system of any of the preceding claims, further comprising an automated control system communicably coupled to the signal processor and configured to adjust one or more parameters of the fluid in response to the resulting output signal.

11. The system of any of the preceding claims, further comprising:

a first electromagnetic radiation source arranged in the first optical computing device and being configured to emit electromagnetic radiation that optically interacts with the fluid prior to entering the fluid separator; and

a second electromagnetic radiation source arranged in the second optical computing device and being configured to emit electromagnetic radiation that optically interacts with the fluid after being discharged from the fluid separator.

12. A method of determining a characteristic of a fluid, comprising:

containing a fluid within a flow path;

conveying the fluid to a fluid separator coupled to the flow path, the fluid separator having an inlet for receiving the fluid and a discharge conduit for discharging the fluid after having undergone a separation process in the fluid separator;

generating a first output signal corresponding to the characteristic of the fluid adjacent the inlet with a first optical computing device, the first optical computing device having a first integrated computational element configured to

optically interact with the fluid and produce and convey optically interacted light to a first detector which generates the first output signal;

generating a second output signal corresponding to the characteristic of the fluid adjacent the discharge conduit with a second optical computing device, the second optical computing device having a second integrated computational element configured to optically interact with the fluid and produce and convey optically interacted light to a second detector which generates the second output signal;

receiving the first and second output signals with a signal processor communicably coupled to the first and second detectors; and

generating a resulting output signal with the signal processor.

13. The method of claim 12, wherein generating the resulting output signal further comprises determining how the characteristic of the fluid changes between the inlet and the discharge conduit.

14. The method of claim 13, wherein the characteristic is a concentration of oil in the fluid.

15. The method of claim 12, 13, or 14, further comprising conveying the resulting output signal to a user for consideration.

16. The method of claim 12, 13, 14, or 15, further comprising undertaking at least one corrective step with an automated control system when a concentration of the characteristic of the fluid surpasses a predetermined range of suitable operation, the automated control system being communicably coupled to the signal processor.

17. The method of claim 12, 13, 14, , 15 or 16, further comprising conveying a warning signal to a user when a concentration of the characteristic of the fluid surpasses a predetermined range of suitable operation.

18. The method of claim 12, 13, 14, 15, 16 or 17, wherein the resulting output signal is a concentration of the characteristic of interest as measured by the second optical computing device, the method further comprising using the resulting output signal as a quality control measure for the fluid.

19. The method of claim 12, 13, 14, 15, 16, 17 or 18, further comprising:

optically interacting electromagnetic radiation emitted from a first electromagnetic radiation source arranged in the first optical computing device with the fluid prior to entering the fluid separator; and

optically interacting electromagnetic radiation emitted from a second electromagnetic radiation source arranged in the second optical computing device with the fluid after being discharged from the fluid separator.

CLAIMS

The invention claimed is:

1. A system, comprising:

a flow path containing a fluid;

a fluid separator coupled to the flow path and having an inlet for receiving the fluid and a discharge conduit for discharging the fluid after having undergone a separation process in the fluid separator;

a first optical computing device arranged adjacent the inlet and having a first integrated computational element configured to optically interact with the fluid and thereby produce and convey optically interacted light to a first detector which generates a first output signal corresponding to a characteristic of the fluid before the fluid enters the fluid separator;

a second optical computing device arranged adjacent the discharge conduit and having a second integrated computational element configured to optically interact with the fluid and thereby produce and convey optically interacted light to a second detector which generates a second output signal corresponding to the characteristic of the fluid after the fluid exits the fluid separator; and

a signal processor communicably coupled to the first and second detectors and configured to receive the first and second output signals and provide a resulting output signal.

2. The system of claim 1, wherein the resulting output signal is indicative of how the characteristic of the fluid changes between the inlet and the discharge conduit.

3. The system of any of the preceding claims, wherein the characteristic of the fluid is a concentration of a substance in the fluid.

4. The system of claim 3, wherein the substance comprises a substance selected from the group consisting of a hydrocarbon, a sulfur-containing gases, carbon dioxide, sand, and particulates.

5. The system of claim 1, wherein the characteristic of the fluid is one or more chemicals or chemical compositions present in the fluid.

6. The system of claim 5, wherein the characteristic comprises a chemical or chemical composition selected from the group consisting of salts,

precipitates, water, chemical tags, physical tags, metals, organic compounds, volatile organic compounds, additives, treatments, polymers, drugs, medicines, poisons, emulsion breakers, digester organisms, de-foaming agents, coalescing agents, flocculants, and any derivatives or combinations thereof.

7. The system of claim 1, wherein the characteristic of the fluid is a concentration of a biological organism.

8. The system of any of the preceding claims, wherein the resulting output signal is a concentration of the characteristic of interest as measured by the second optical computing device.

9. The system of claim 8, wherein the resulting output signal is used as a quality control measure for the fluid.

10. The system of any of the preceding claims, further comprising an automated control system communicably coupled to the signal processor and configured to adjust one or more parameters of the fluid in response to the resulting output signal.

11. The system of any of the preceding claims, further comprising:

a first electromagnetic radiation source arranged in the first optical computing device and being configured to emit electromagnetic radiation that optically interacts with the fluid prior to entering the fluid separator; and

a second electromagnetic radiation source arranged in the second optical computing device and being configured to emit electromagnetic radiation that optically interacts with the fluid after being discharged from the fluid separator.

12. A method of determining a characteristic of a fluid, comprising:

containing a fluid within a flow path;

conveying the fluid to a fluid separator coupled to the flow path, the fluid separator having an inlet for receiving the fluid and a discharge conduit for discharging the fluid after having undergone a separation process in the fluid separator;

generating a first output signal corresponding to the characteristic of the fluid adjacent the inlet with a first optical computing device, the first optical computing device having a first integrated computational element configured to optically interact with the fluid and produce and convey optically interacted light to a first detector which generates the first output signal;

generating a second output signal corresponding to the characteristic of the fluid adjacent the discharge conduit with a second optical computing device, the second optical computing device having a second integrated computational element configured to optically interact with the fluid and produce and convey optically interacted light to a second detector which generates the second output signal;

receiving the first and second output signals with a signal processor communicably coupled to the first and second detectors; and

generating a resulting output signal with the signal processor.

13. The method of claim 12, wherein generating the resulting output signal further comprises determining how the characteristic of the fluid changes between the inlet and the discharge conduit.

14. The method of claim 13, wherein the characteristic is a concentration of oil in the fluid.

15. The method of claim 12, 13, or 14, further comprising conveying the resulting output signal to a user for consideration.

16. The method of claim 12, 13, 14, or 15, further comprising undertaking at least one corrective step with an automated control system when a concentration of the characteristic of the fluid surpasses a predetermined range of suitable operation, the automated control system being communicably coupled to the signal processor.

17. The method of claim 12, 13, 14, , 15 or 16, further comprising conveying a warning signal to a user when a concentration of the characteristic of the fluid surpasses a predetermined range of suitable operation.

18. The method of claim 12, 13, 14, , 15, 16 or 17, wherein the resulting output signal is a concentration of the characteristic of interest as measured by the second optical computing device, the method further comprising using the resulting output signal as a quality control measure for the fluid.

19. The method of claim 12, 13, 14, , 15, 16, 17 or 18, further comprising:

optically interacting electromagnetic radiation emitted from a first electromagnetic radiation source arranged in the first optical computing device with the fluid prior to entering the fluid separator; and

optically interacting electromagnetic radiation emitted from a second electromagnetic radiation source arranged in the second optical computing device with the fluid after being discharged from the fluid separator.