particles and second particles. The light beam source is configured to project a light beam on a first side of the sample holder. The detector is configured to detect the light beam scattered by the first particles at a position facing a second side of the sample holder, the first side of the sample holder forming an angle with the second side of the sample holder. An intensity of the light beam is used to determine the first particle concentration in the fluid and a weight of the first particles is determined from the first particle concentration. The weighing scale is configured to weigh the sample holder with the diluted fluid, the total weight of the sample holder and the diluted fluid being used to determine a weight of the second particles to use for determining the second particle concentration.

[0012a] In view of the above, in accordance with an aspect of the present embodiment, there is provided a method for determining particle concentration of first particles in a fluid, wherein the fluid further comprises at least second particles, wherein the first particles have a first particle size bigger than a second particle size of the second particles. The method comprises diluting the fluid in an optically transparent sample holder without dissolving the second particles; projecting a light beam on a first side of the sample holder; detecting the light beam scattered by the first particles at a position facing a second side of the sample holder; and determining the particle concentration of the first particles in the fluid from an intensity of the scattered light beam, wherein the first side of the sample holder forms an angle with the second side of the sample holder is 90°.

[0012b] In accordance with another aspect of the present embodiment, there is provided a method for determining a first particle concentration and a second particle concentration in a fluid. The method comprises diluting the fluid in an optically transparent sample holder to a degree of dilution of at least one hundred parts of

diluent to one part of the fluid; projecting a light beam on a first side of the sample holder; detecting the light beam scattered by the first particles at a position facing a second side of the sample holder; determining the first particle concentration in the fluid from an intensity of the scattered light beam, a weight of the first particles being determined from the first particle concentration; weighing the sample holder containing the fluid to obtain a total weight thereof; determining a weight of the second particles from the total weight of the sample holder and the weight of the first particles; and determining the second particle concentration from the weight thereof,

wherein the first side of the sample holder forms an angle with the second side of the sample holder.

[0012c] In accordance with another aspect of the present embodiment, there is provided a system for determining particle concentration of first particles in a fluid, wherein the fluid further comprises at least second particles, wherein the first particles have a first particle size bigger than a second particle size of the second particles. The system comprises: an optically transparent sample holder configured to hold a diluted fluid containing the first particles and the second particles; a light beam source configured to project a light beam on a first side of the sample holder; and a detector configured to detect the light beam scattered by the first particles at a position facing a second side of the sample holder, an intensity of the scattered light beam being used to determine the particle concentration of the first particles in the fluid, wherein the first side of the sample holder forms an angle with the second side of the sample holder is 90°.

[0012d] In accordance with yet another aspect of the present embodiment, there is provided a system for determining a first particle concentration and a second particle concentration in a fluid. The system comprises: an optically transparent sample holder

[0029] In an embodiment, the angle formed by the first side and the second side of the sample holder is approximately 90°.

[0030] In an embodiment, the system further comprises a casing configured to shield the system from interference from other light beams.

[0031] In an embodiment, the detector is a photodiode.

[0032] In an embodiment, the system further comprises a dispenser configured to dispense a predetermined amount of the fluid into the sample holder and/or dispense a predetermined amount of a dilute into the sample holder.

[0033] In an embodiment, the system further comprises a microcontroller unit to control on-off of the light beam source and the detector, and/or to control the dispenser.

[0034] In an embodiment, the system further comprises a display configured to display the particle concentration.

[0035] In an embodiment, the fluid is milk and the particles are fat particles.

[0036] A system for determining a first particle concentration and a second particle concentration in a fluid is provided. The system comprises a optically transparent sample holder configured to hold a diluted fluid containing a first particle and a second particle; a light beam source configured to project a light beam on a first said of the sample holder; a detector configured to detect the light beam scattered by the first particles at a position facing a second side of the sample holder, an intensity of the light beam being used to determine the first particle concentration in the fluid, a weight of the first particle being determined from the first particle concentration; and

a weighing scale configured to weigh the sample holder with the diluted fluid; the total weight of the sample holder and the diluted fluid being used to determine a

weight of the second particles which is used to determine the second particle concentration, wherein the first side of the sample holder forms an angle with the second side of the sample holder.

[0037] In an embodiment, the first particles have a first particle size bigger than a second particle size of the second particles.

[0038] In an embodiment, the fluid is milk, the first particles are fat particles and the second particles are solid-non-fat particles.

[0039] Now referring to FIG.1, a system 100 for determining a particle concentration in a fluid is depicted in accordance with a present embodiment. FIG. 1A shows a top view of the system 100 while FIG. 1B shows a side view of the system 100. The system 100 comprises a sample holder 112 for holding a milk sample pre-diluted with water. The sample holder 112 is optically transparent, for example, in the form of a glass bottle, curvette or any other containers unlimited by size or shape as long as the light beam can be transmitted through. The system 100 further comprises a light source 114 for projecting a light beam on a first side of the sample holder 112 and a detector 116 for detecting the light beam scattered by the particle at a position facing a second side of the sample holder 112. The first side of the sample holder 112 forms an angle with the second side of the sample holder 112. It is understood that the detector 116 can detect the light beam scattered by the particle within an area around the direction facing the second side of the sample holder. The angle of scattering used in the present embodiment as shown in FIGs. 1A and 1B is perpendicular, but the present embodiment is also applicable to scattering angles approximately perpendicular to the path of the incident beam (see FIG. 1C).

[0052] The system may also include an electronic circuit 122 to activate the light source and read the detector's output. The electronic circuit 122 may comprise a programmable device such as a microcontroller unit to control the operating sequence and execute specific tasks such as controlling the fluid dispenser 120, activating the light 114, reading the detector 116 output via analog-digital converter (ADC), receiving data from the weighing machine 118 via communication ports e.g., RS232, executing an embedded algorithm to analyze the input data to derive fat and SNF concentration results, and showing the results on an LCD unit 124. The whole system 300 may further be enclosed in a casing 126 to shield off any light which can potentially affect the photo-diode reading.

[0053] Referring to FIG. 4, a method for determining a particle concentration in a fluid is provided. The method comprises diluting the fluid in an optically transparent sample holder at step 410; projecting a light beam on a first side of the sample holder at step 420; detecting the light beam scattered by the particles at a position facing a second side of the sample holder at step 430; and determining the particle concentration in the fluid from an intensity of the scattered light beam at step 440, wherein the first side of the sample holder forms an angle with the second side of the sample holder.

[0054] In an embodiment, the angle formed by the first side and the second side of the sample holder is approximately 90°.

[0055] In an embodiment, diluting the fluid comprises diluting a predetermined amount of the fluid in a predetermined amount of a diluent.

[0056] In an embodiment, diluting the fluid comprises diluting one part of the fluid with at least 100 parts of the diluent.

CLAIMS

What is claimed is:

1. A method for determining particle concentration of first particles in a fluid, wherein the fluid further comprises at least second particles, wherein the first particles have a first particle size bigger than a second particle size of the second particles, the method comprising:

diluting the fluid in an optically transparent sample holder without dissolving the second particles;

projecting a light beam on a first side of the sample holder;

detecting the light beam scattered by the first particles at a position facing a second side of the sample holder; and

determining the particle concentration of the first particles in the fluid from an intensity of the scattered light beam,

wherein the first side of the sample holder forms an angle with the second side of the sample holder is 90°.

2. The method in accordance with claim 1, wherein diluting the fluid comprises diluting a predetermined amount of the fluid in a predetermined amount of a diluent.

3. The method in accordance with claim 2, wherein diluting the fluid comprises diluting one part of the fluid with at least 100 parts of the diluent.

4. The method in accordance with claim 1, wherein the diluting step comprises diluting the fluid without dissolving the second particles with the presence of a solvent or a chemical reagent.

5. The method in accordance with claim 1, wherein the light beam is a red laser.

6. The method in accordance with claim 1, wherein the intensity of the scattered light beam has a linear relationship with the particle concentration.

7. The method in accordance with claim 1, wherein the fluid is milk, the first particles are fat particles, and the second particles are protein particles.

8. A method for determining a first particle concentration and a second particle concentration in a fluid, the method comprising:

diluting the fluid in an optically transparent sample holder to a degree of dilution of at least one hundred parts of diluent to one part of the fluid;

projecting a light beam on a first side of the sample holder;

detecting the light beam scattered by the first particles at a position facing a second side of the sample holder;

determining the first particle concentration in the fluid from an intensity of the scattered light beam, a weight of the first particles being determined from the first particle concentration;

weighing the sample holder containing the fluid to obtain a total weight thereof;

determining a weight of the second particles from the total weight of the sample holder and the weight of the first particles; and

determining the second particle concentration from the weight thereof,

wherein the first side of the sample holder forms an angle with the second side of the sample holder.

9. The method in accordance to claim ~~9~~8, wherein the first particles have a first particle size bigger than a second particle size of the second particles.

10. The method in accordance to claim ~~9~~8, wherein the fluid is milk, the first particles are fat particles and the second particles are solid-non-fat particles.

11. A system for determining particle concentration of first particles in a fluid, wherein the fluid further comprises at least second particles, wherein the first particles have a first particle size bigger than a second particle size of the second particles, the system comprising:

an optically transparent sample holder configured to hold a diluted fluid containing the first particles and the second particles;

a light beam source configured to project a light beam on a first side of the sample holder; and

a detector configured to detect the light beam scattered by the first particles at a position facing a second side of the sample holder, an intensity of the scattered light beam being used to determine the particle concentration of the first particles in the fluid,

wherein the first side of the sample holder forms an angle with the second side of the sample holder is 90°.

12. The system in accordance with claim 11, further comprising a casing configured to shield the system from interference from other light beams.

13. The system in accordance with claim 11, wherein the detector is a photodiode.

14. The system in accordance with claim 11, further comprising a dispenser configured to dispense a predetermined amount of the fluid into the sample holder and/or dispense a predetermined amount of a dilute into the sample holder.

15. The system in accordance with claim 14, further comprising:

a microcontroller unit to control on-off of the light beam source and the detector, and/or to control the dispenser.

16. The system in accordance with claim 11, further comprising:

a display configured to display the particle concentration of the first particles.

17. The system in accordance with claim 11, wherein the fluid is milk, the first particles are fat particles and the second particles are protein particles.

18. A system for determining a first particle concentration and a second particle concentration in a fluid, the system comprising:

an optically transparent sample holder configured to hold a diluted fluid containing first particles and second particles;

a light beam source configured to project a light beam on a first side of the sample holder;

a detector configured to detect the light beam scattered by the first particles at a position facing a second side of the sample holder, an intensity of the light beam being used to determine the first particle concentration in the fluid, a weight of the first particles being determined from the first particle concentration;

a weighing scale configured to weigh the sample holder with the diluted fluid; and

a microcontroller unit configured to receive the total weight of the sample holder and the diluted fluid from the weighing scale to determine a weight of the second particles and determine the second particle concentration using the weight of the second particles,

wherein the first side of the sample holder forms an angle with the second side of the sample holder.

19. The system in accordance to claim 18, wherein the first particles have a first particle size bigger than a second particle size of the second particles.

20. The system in accordance to claim 18, wherein the fluid is milk, the first particles are fat particles and the second particles are solid-non-fat particles.