CLAIMS

1. A bioreactor for cell processing, comprising:

a container having:

a base section comprising a transparent or translucent sensor window,

a top section arranged opposite to the base section and comprising a fluid inlet and a fluid outlet, and

a sidewall extending between the base section and the top section and defining an internal volume of the container adapted to hold a cell suspension, and

at least one optical element disposed on the sensor window within the internal volume, the optical element being adapted to emit a fluorescence signal in response to incident light, the fluorescence signal being associated with one or more parameters of the cell suspension.

2. The bioreactor according to claim 1, further comprising at least one optical sensor positioned proximate to an outer surface of the sensor window.

3. The bioreactor according to claim 2, wherein the optical sensor is in alignment with the optical element.

4. The bioreactor according to claim 2 or claim 3, wherein the optical sensor comprises an LED arranged to emit light onto the optical element, and wherein the optical sensor is configured to receive the fluorescence signal emitted by the optical element.

5. The bioreactor according to any one of claims 2 to 4, wherein at least two optical elements are disposed on the sensor window and wherein each optical element has a corresponding optical sensor.

6. The bioreactor according to any one of claims 1 to 5, wherein the one or more parameters of the cell suspension is a dissolved oxygen concentration, and/or a pH, and/or a dissolved carbon dioxide concentration.

7. The bioreactor according to any one of claims 1 to 6, wherein the at least one optical element is positioned at or near a centre position of the base section.

8. The bioreactor according to any one of claims 1 to 7, wherein the bioreactor further comprises at least one chemical sensor.

9. The bioreactor according to claim 8, wherein the at least one chemical sensor is a glucose sensor and/or a lactate sensor.

~~10. The bioreactor according to claim 8 or claim 9, wherein the at least one chemical sensor is an enzymatic-based sensor.~~

~~11~~10. The bioreactor according to any one of claims 1 to ~~10~~9, wherein the bioreactor further comprises a temperature sensor.

~~12~~11. The bioreactor according to any one of claims 1 to ~~11~~10, wherein the sidewall of the container comprises a compressible wall element.

~~13. The bioreactor according to claim 12, wherein the base section is connectable to an agitator operable to move the base section relative to the top section to compress or extend the compressible wall element.~~

~~14~~12. A cell processing system comprising:

a bioreactor according to any of claims 1 to ~~13~~11,

an optical sensor positioned proximate to an outer surface of the sensor window to sense a fluorescence signal emitted by the optical element associated with one or more parameters of the cell suspension, and

a controller configured to receive a sensor signal from the optical sensor, the signal corresponding to the one or more parameters of the cell suspension.

~~15~~13. The cell processing system according to claim ~~14~~12, further comprising an agitator arranged to engage the base section of the bioreactor and operable to move the base section, wherein the agitator comprises an agitation plate arranged to engage the base section of the container, and wherein the agitation plate has an aperture for receiving the optical sensor.

~~16. The cell processing system according to claim 15, wherein the agitator comprises an agitation plate arranged to engage the base section of the container, and wherein the agitation plate has an aperture for receiving the optical sensor.~~

~~17~~14. The system according to claim ~~15~~ 13~~or claim 16~~, wherein the sidewall of the container comprises a compressible wall element, and wherein the controller is configured to control the agitator to move the base section relative to the top section to stimulate mixing of a fluid within the bioreactor.

~~18~~15. The cell processing system according to any one of claims ~~14~~ 12 to ~~17~~14, wherein the controller is configured to adjust a condition within the bioreactor based on the received sensor signal.

~~19~~16. The cell processing system of claim ~~18~~15, wherein the controller is configured to adjust the condition within the bioreactor until the parameter is equal to a target parameter.

~~20~~17. The system according to claim ~~18~~ 15 or claim ~~19~~16, wherein the controller adjusts the condition within the bioreactor by adjusting the gas flow into the bioreactor.

~~21~~18. A method of cell processing, the method comprising:

providing a cell processing system according to any of claims ~~15~~ 13 to ~~20~~17,

sensing a fluorescence signal emitted by the optical element associated with the one or more parameters of the cell suspension using the optical sensor.

~~22~~19. The method according to claim ~~21~~18, further comprising adjusting a condition within the bioreactor based on the sensed fluorescence signal.

~~23~~20. The method according to claim ~~22~~19, wherein adjusting the condition within the bioreactor includes adjusting the gas flow into the bioreactor and/or wherein the sidewall of the container comprises a compressible wall element, and wherein adjusting the condition within the bioreactor includes moving the base section relative to the top section to stimulate mixing of a fluid within the bioreactor.

~~24. The method according to claim 22 or claim 23, wherein the sidewall of the container comprises a compressible wall element, and wherein adjusting the condition within the bioreactor includes moving the base section relative to the top section to stimulate mixing of a fluid within the bioreactor.~~