Claims

1. A bioreactor filtration system, comprising:

   a hollow fiber filter module comprising a filter within a filter housing, the filter housing comprising a first end, a second end, and at least one permeate port, the hollow fiber filter module defining a feed/retentate channel and a permeate channel separated from the feed/retentate channel by the filter;

   first and second culture vessels attached to each of the first and second ends of the hollow fiber filter module, respectively, wherein each culture vessel comprises an outer portion, an inner flexible vessel disposed within the outer portion, said inner flexible vessel configured to change in volume in response to a change in pressure in the outer portion, an outer port fluidly connected to the outer portion, and an inner port fluidly connected to the inner flexible vessel and fluidly isolated from the outer portion, wherein the feed/retentate channel is in fluid communication with each inner port;

   a pressure source in fluid communication with each of the outer portions of the culture vessels; and

   first and second valves interposed between the pressure source and the first and second outer portions respectively.

2. The system of claim 1, wherein the first and second culture vessels are disposed on first and second scales, respectively.
3. The system of any of claims 1-2, wherein the system is gamma sterilizable.
4. A filtration system, comprising:

   a hollow fiber filter module comprising a filter within a filter housing, the filter housing comprising a first end, a second end, and at least one permeate port, the hollow fiber filter module defining a feed/retentate channel and a permeate channel separated from the feed/retentate channel by the filter;

   first and second fluid vessels attached to each of the first and second ends of the hollow fiber filter module, respectively, wherein each fluid vessel comprises an outer portion, an inner flexible vessel disposed within the outer portion and fluidly isolated from the outer portion, said inner flexible vessel configured to translate a change in pressure in the outer portion to a retentate contained therein, an inner port fluidly connected to the inner flexible vessel and configured to provide a flow therefrom in response to the change in pressure,

wherein the feed/retentate channel is in fluid communication with each inner port; and

a pressure source in fluid communication with each of the outer portions of the culture vessels, the pressure source configured to effect the change in pressure.

5. The system of claim 4, further comprising a first fluid source coupled to the first fluid vessel, a second fluid source coupled to the second fluid vessel, or both.
6. The system of claim 5, wherein the first fluid source, the second fluid source, or both, comprises a bioreactor.
7. A method of filtering bioreactor fluid, comprising:

alternating the flow of a fluid through a feed/retentate channel of a hollow fiber filter module between first and second culture vessels using a pressure source,

wherein each culture vessel comprises an outer portion, an inner flexible vessel disposed within the outer portion, said inner flexible vessel configured to change in volume in response to a change in pressure in the outer portion, an outer port fluidly connected to the outer portion, and an inner port fluidly connected to the inner flexible vessel and fluidly isolated from the outer portion, wherein the feed/retentate channel is in fluid communication with each inner port,

wherein fluid flows through the hollow fiber filter module from a first inner flexible vessel to a second inner flexible vessel when pressure is introduced into a first outer portion surrounding the first inner flexible vessel, and

wherein the system alternates when pressure is introduced into a second outer portion surrounding the second inner flexible vessel.

8. The method of claim 7, wherein a resulting permeate is removed from the system.
9. The method of claim 8, wherein the pressure system comprises positive pressure or vacuum.
10. A method of filtering a bioreactor fluid, comprising:

creating a pressure differential between first and second vessels, wherein the pressure differential causes a responsive flow between third and fourth vessels,

wherein the third vessel is disposed within and fluidly isolated from the first vessel,

wherein the fourth vessel is disposed within and fluidly isolated from the second vessel, and

wherein a hollow fiber filtration module is fluidly connected between the third vessel and the fourth vessel.

11. The method of claim 10, further comprising alternating the pressure differential between the first and second vessels.