What is claimed is:

1. A method of inhibiting contamination of a sterilized system, the method comprising

providing a system comprising first vessel, wherein the first vessel comprises a liquid;

flowing a first volume of the liquid out of the first vessel and through a volume of sterilizing gas and into a second vessel.

2. The method of claim 1, wherein the volume of sterilizing gas is disposed within a headspace of the second vessel.

3. The method of claim 2, wherein the second vessel comprises

(i) a fluid inlet configured such that the volume of liquid entering the second vessel passes through the head space,

(ii) a fluid outlet configured such that liquid exiting the second vessel is flowed from below the sterilizing gas-filled headspace,

(iii) at least one gas inlet; and

(iv) at least one gas outlet,

wherein the fluid inlet is in fluid communication with the first vessel.

4. The method of claim 3, wherein the first vessel comprises

a fluid outlet in fluid communication with a fluid inlet of the second vessel.

5. The method of claim 2, wherein the sterilizing gas is sparged into the second vessel or introduced directly into the head space of the second vessel.

6. The method of claim 1, wherein the first vessel is a bioreactor, a chromatography system, a microfiltration (MF) system, or an ultrafiltration/ diafiltration (UF/DF) system.

7. The method of claim 1, wherein the first volume of the liquid comprises a recombinant therapeutic protein.

8. The method of claim 7, further comprising:

(i) flowing a second volume of liquid from the second vessel into a first multi-column chromatography system (MCCS1);

(ii) capturing said recombinant therapeutic protein in the liquid culture medium using the MCCS1, wherein the eluate of the MCCS1 containing the recombinant therapeutic protein is continuously fed into a second multi-column chromatography system (MCCS2); and

(iii) purifying and polishing the recombinant therapeutic protein using the MCCS2, wherein the eluate from the MCCS2 is a recombinant therapeutic protein; and

wherein the process is integrated and runs continuously from said first vessel to the eluate from the MCCS2 that is the recombinant therapeutic protein.

9. The method of claim 7, further comprising flowing a second volume of liquid from the second vessel into an apparatus for purifying and polishing the recombinant protein.

10. The method of claim 8, wherein the second volume of liquid comprises a recombinant therapeutic protein.

11. The method of claim 1, wherein the sterilizing gas is selected from the group consisting of ozone, ethylene oxide, nitrogen dioxide, or vaporized hydrogen peroxide.

12. A system for isolating sterile process streams from non-sterile environments, comprising:

a first vessel comprising a fluid outlet; and

at least one second vessel comprising:

(i) a fluid inlet in fluid communication with the fluid outlet of the first vessel and configured such that fluid entering the second vessel passes through a sterilizing-gas filled head space within the second vessel,

(ii) a fluid outlet configured such that fluid exiting second vessel is removed from below the sterilizing gas-filled headspace within the second vessel,

(iii) at least one gas inlet; and

(iv) at least one gas outlet.

13. The system of claim 12, wherein the first vessel is a fluid conduit, a production bioreactor, a seed bioreactor, a batch-fed bioreactor, a chromatography system, a microfiltration (MF) system, or an ultrafiltration/ diafiltration (UF/DF) system.

14. The system of claim 12, further comprising a filter disposed in a fluid conduit between the first vessel and the second vessel and configured to remove particulate matter from the fluid in the fluid conduit.

15. The system of claim 12, further comprising a pump system disposed in the fluid conduit.

16. The system of claim 15, wherein the pump system comprises a pump configured to remove a volume of fluid from the vessel outlet and flow the volume into the fluid inlet of the second vessel.

17. The system of claim 12, further comprising a pump system in fluid communication with the fluid outlet of the second vessel.

18. The system of claim 16, further comprising a filter disposed in the fluid conduit between the first vessel and the pump, and configured to remove particulate matter from the fluid present in the fluid conduit.

19. The system of claim 12, wherein the sterilizing gas is selected from the group consisting of ozone, ethylene oxide, nitrogen dioxide, or vaporized hydrogen peroxide.

20. The system of claim 12, wherein at least one gas inlet is in gas communication with a system for generating or delivering a sterilizing gas, or for generating and delivering a sterilizing gas.

21. The system of claim 20, wherein the system for generating or delivering a sterilizing gas is an ozone generation or delivery system, or an ozone generation and delivery system.

22. The system of claim 12, wherein at least one gas inlet is connected to one or more gas sparging elements which permit gas to be emitted into the second vessel.

23. The system of claim 22, wherein the gas sparging element is a filter, an open pipe or a frit.

24. The system of claim 12, further comprising a sensor for monitoring the sterilizing gas concentration within the headspace of the second vessel.

25. The system of claim 12, wherein the second vessel fluid outlet is in fluid communication with an apparatus for purifying and polishing a recombinant protein.