Claims:

1. A filter housing comprising:

an inlet;

a retentate outlet;

a permeate outlet;

at least one pre-wetted hydrophobic hollow fiber filter extending between the inlet and the retentate outlet, thereby fluidly separating the permeate outlet from the retentate outlet and the inlet; and

a potting material connecting the hydrophobic hollow fibers to the filter housing and sealing at least one of the inlet and the retentate outlet from the permeate outlet,

wherein the pre-wetted hydrophobic hollow fiber filter consists of hydrophobic polymers and lacks hydrophilic polymers, and

wherein the filter is contained in an aqueous solution within the filter housing.

2. The filter housing of claim 1, wherein the hydrophobic hollow fiber comprises a plurality of pores.

3. The filter of claim 2, wherein the pores are 0.05 um to 2.0 um in diameter or from 0.05 um to 0.2 um.

4. The filter housing of any one of claims 1 to 3 wherein the hydrophobic hollow fiber has a surface area of 10 cm2 to 90 m2.

5. The filter housing of any one of claims 1 to 4, wherein the hydrophobic hollow fiber has an inner diameter of 0.2 mm to 5.0 mm.

6. The filter housing of any one of claims 1 to 5, wherein the hydrophobic hollow fiber has a wall thickness of 50 um to 500 um.

7. The filter housing of any of the preceding claims, wherein the hydrophobic hollow fiber filter comprises polypropylene, or a co-polymer thereof.

8. A method for perfusion cell culture, comprising:

circulating a cell culture fluid through the hydrophobic hollow fiber filter in the filter housing of claim 1, thereby separating the cell culture fluid into a filtrate and a retentate; and

returning the retentate to the bioreactor.

9. The method of claim 8, wherein the perfusion cell culture is selected from the group consisting of: n-1 culture and media exchange, in either case wherein the filtrate is not retained.

10. The method of claim 8, wherein the perfusion cell culture is selected from the group consisting of: high productivity harvest, concentrated fed batch culture, or continuous perfusion, in each case wherein the filtrate comprises a bioproduct of interest and is retained.

11. The method of any one of claims 8 to 10, wherein the cell culture is a mammalian cell culture, yeast cell culture, prokaryotic cell culture, or insect cell culture.

12. The method of any one of claims 8 to 11, wherein the circulation of the cell culture is performed by alternating tangential flow.

13. The method of any one of claims 8 to 11, wherein the circulation of the cell culture is performed by tangential flow filtration.

14. The method of any one of claims 8 to 13, wherein the circulation of the cell culture fluid is performed at a filter flux of 1, 2, 3, 4, 5, 10, 15, 20, 22.5, 25, 30 l/m2▪h.

15. The method of any one of claims 8 to 14, wherein the separation system contains one or more of the following: peristaltic tubing through a peristaltic pumphead, maglev pump, ATF pump, and other positive displacement disposable pumps.

16. The method of any one of claims 8 to 15, wherein the method is performed over 10, 20, 30, 40, 50 days.

17. The method of any one of claims 8 to 16, wherein the hydrophobic hollow fiber comprises a polyolefin or a fluoropolymer.

18. The method of claim 17, wherein the polyolefin is polypropylene, polyethylene, or copolymers
thereof.

19. A method of assembling a perfusion culture system comprising the filter housing of claim 1 comprising the steps of:

disposing the pre-wetted hydrophobic hollow-fiber filter into the filter housing and, optionally, connecting a permeate outlet of the filter housing to a permeate collection vessel, wherein:

(a) the perfusion culture system comprises a process vessel, a first conduit fluidly connecting an interior of the process vessel to an interior of the filter housing to define a filter feed channel and, optionally, a second conduit connecting the interior of the filter housing to the process vessel and defining a retentate channel, and (b) prior to disposal within the filter housing the hydrophobic hollow fiber filter is pre-wetted with a solution comprising an alcohol and is stored in a buffered aqueous solution.

20. The method of claim 19, wherein the filter housing further comprises an outlet for a filtrate, the outlet being fluidly separated from the feed and retentate channels by the hollow fiber hydrophobic filter.

21. The method of claim 19 or 20, wherein the circulation of the cell culture fluid is performed at a filter flux of 1, 2, 3, 4, 5, 10, 15, 20, 22.5, 25, 30 l/m2▪h.

22. The method of any one of claims 19 to 21, wherein the hydrophobic hollow fiber filter comprises polypropylene, or a co-polymer thereof.

23. A method of perfusion cell culture, comprising:

passing a cell culture medium through the filter housing of claim 1 and tangentially across a hydrophobic hollow fiber filter to reduce a concentration of a first component of the cell culture medium, wherein the first component does not comprise a recombinant peptide, nucleic acid or viral capsid.

24. The method of claim 23, wherein the method is performed over 10, 20, 30, 40, 50 days.

25. The method of claim 23 or 24, wherein the circulation of the cell culture fluid is performed at a filter flux of 1, 2, 3, 4, 5, 10, 15, 20, 22.5, 25, 30 l/m2▪h.

26. The method of any one of claims 23 to 25, wherein the hydrophobic hollow fiber comprises a polyolefin or a fluoropolymer.

27. The method of claim 26, wherein the polyolefin is polypropylene, polyethylene, or copolymers

thereof.

28. A method of filtering a fluid, comprising:

passing the fluid through the filter housing of claim 1 such that the fluid flows in a non-laminar manner through the hydrophobic hollow fiber filter, and such that the fluid is separated into a retentate and a permeate.

29. The method of claim 28, wherein a product of a feed velocity of the system and an inner diameter of the hydrophobic hollow fiber filter is greater than 2500 mm2s-1.

30. The method of claim 28 or 29, wherein a Reynolds number characterizing the flow of fluid into the filter is greater than 2000, 2300, 2500 , 3000, 3500, or 4000.

31. The method of any one of claims 28 to 30, wherein the hydrophobic hollow fiber comprises a polyolefin or a fluoropolymer.

32. The method of claim 31, wherein the polyolefin is polypropylene, polyethylene, or copolymers

thereof.

33. The method of any one of claims 28 to 32, wherein a direction of flow through the hydrophobic hollow fiber filter is alternated.

34. The method of claim 28, further comprising a step of collecting a filter permeate.

35. The method of any one of claims 28 to 34, wherein the hydrophobic hollow fiber filter retains a non-desired species.

36. The method of claim 35, wherein the retained non-desired species is selected from the group consisting of: a species of mammalian cell origin; a species of microbial cell origin;

a species of viral origin; a protein; a nucleic acid; a polysaccharide; or a complex of any of the foregoing.

37. The method of claim 34, wherein a desired species passes through the hydrophobic hollow fiber filter into a permeate.

38. The method of claim 37, wherein the desired species is selected from the group consisting of: a species of mammalian cell origin; a species of microbial cell origin; a species of viral origin; a protein; a nucleic acid; a polysaccharide; a virus; a microcarrier; a particle; or a complex of any of the foregoing.

39. A composition comprising a permeate collected according to the method of claim 38.

40. The composition of claim 39, wherein a concentration of a desired species in the composition is at least 10x, 20x, 40x, 50x, 75x or 100x greater than a concentration of the desired species in the fluid.

41. The composition of claim 39, wherein a concentration of a non-desired species is at least 10x, 20x, 40x, 50x, 75x or 100x less than a concentration of the non-desired species in the fluid.

42. A method of claim 28, further comprising the step of removing a permeate from the fluid, thereby increasing a concentration of a desired species that is retained by the

hydrophobic hollow fiber filter, wherein the concentration of the desired species is increased by 5X, 10X, 20X, 40X, 50X, 75X or 100X.

43. A method of filtering a fluid, comprising:

passing the fluid through the filter housing of claim 1 and into the hydrophobic hollow fiber filter under conditions in which a feed velocity is 2000, 2300, 2500, 3000, 3500 or 4000 times greater than the quotient of a kinematic viscosity of the fluid over the hollow fiber filter diameter.