1. A biomanufacturing system, comprising:

a perfusion bioreactor, wherein the perfusion bioreactor comprises:

a reaction chamber configured to receive at least one feed stream comprising at least one cell culture medium;

a suspension comprising the at least one cell culture medium and at least a first type of biological cells configured to express at least one biologically-produced product;

at least one filter probe at least partially submerged in the suspension, wherein the at least one filter probe is configured to produce at least one filtrate stream lean in the first type of biological cells relative to the suspension, wherein the at least one filtrate stream comprises the at least one biologically-produced product;

an adjustment module fluidically connected to the perfusion bioreactor, wherein the adjustment module is configured to adjust one or more properties of the at least one filtrate stream to produce an adjusted filtrate stream; and

a purification module fluidically connected to the adjustment module, wherein the purification module is configured to remove at least a first type of impurity and a second type of impurity from the adjusted filtrate stream to produce a purified filtrate stream, wherein the purification module comprises:

a first partitioning unit configured to remove at least the first type of impurity from the adjusted filtrate stream to produce a first partitioned filtrate stream lean in the first type of impurity relative to the adjusted filtrate stream, wherein the first partitioned filtrate stream comprises the at least one biologically-produced product; and

a second partitioning unit configured to remove at least a second type of impurity from the first partitioned filtrate stream to produce a second partitioned filtrate stream lean in the second type of impurity relative to the first partitioned filtrate stream, wherein the second partitioned filtrate stream comprises the at least one biologically-produced product,

wherein the system is configured to be continuously operated.

2. A method of producing at least one biologically-produced product, comprising:

supplying at least one feed stream comprising at least one cell culture medium to a perfusion bioreactor at a first flow rate;

producing, within the perfusion bioreactor, a suspension comprising the at least one cell culture medium and at least a first type of biological cells expressing the at least one biologically-produced product;

causing at least a portion of the suspension to flow through at least one filter probe to produce at least one filtrate stream lean in the first type of biological cells, wherein the at least one filtrate stream comprises the at least one biologically-produced product, wherein the at least one filter probe is at least partially submerged in the suspension;

adjusting one or more properties of the at least one filtrate stream to produce an adjusted filtrate stream;

removing, within a purification module, at least a first type of impurity and a second type of impurity from the adjusted filtrate stream to produce a purified filtrate stream flowing at a second flow rate, wherein the purified filtrate stream comprises the at least one biologically-produced product and is lean in the first type of impurity and the second type of impurity relative to the adjusted filtrate stream, wherein producing the purified filtrate stream comprises:

removing, within a first partitioning unit, at least the first type of impurity from the adjusted filtrate stream to produce a first partitioned filtrate stream lean in the first type of impurity relative to the adjusted filtrate stream, wherein the first partitioned filtrate stream comprises the at least one biologically-produced product; and

removing, within a second partitioning unit, at least the second type of impurity from the first partitioned filtrate stream to produce a second partitioned filtrate stream lean in the second type of impurity relative to the first partitioned filtrate stream, wherein the second partitioned filtrate stream comprises the at least one biologically-produced product.

3. A biomanufacturing system, comprising:

a perfusion bioreactor, wherein the perfusion bioreactor comprises:

a reaction chamber configured to receive at least one feed stream comprising at least one cell culture medium;

a suspension comprising the at least one cell culture medium and at least a first type of biological cells configured to express at least one biologically-produced product;

a level sensing system configured to measure a level of the suspension in the reactor chamber of the perfusion bioreactor;

at least one filter probe at least partially submerged in the suspension, wherein the at least one filter probe is configured to produce at least one filtrate stream lean in the first type

of biological cells relative to the suspension, wherein the at least one filtrate stream comprises the at least one biologically-produced product;

an adjustment module fluidically connected to the perfusion bioreactor, wherein the adjustment module is configured to adjust one or more properties of the at least one filtrate stream to produce an adjusted filtrate stream; and

a purification module fluidically connected to the adjustment module, wherein the purification module is configured to remove at least a first type of impurity and a second type of impurity from the adjusted filtrate stream to produce a purified filtrate stream, wherein the purification module comprises:

a first partitioning unit configured to remove at least the first type of impurity from the adjusted filtrate stream to produce a first partitioned filtrate stream lean in the first type of impurity relative to the adjusted filtrate stream, wherein the first partitioned filtrate stream comprises the at least one biologically-produced product; and

a second partitioning unit configured to remove at least a second type of impurity from the first partitioned filtrate stream to produce a second partitioned filtrate stream lean in the second type of impurity relative to the first partitioned filtrate stream, wherein the second partitioned filtrate stream comprises the at least one biologically-produced product,

wherein the system is configured to be continuously operated.

4. A method of producing at least one biologically-produced product, comprising:

supplying at least one feed stream comprising at least one cell culture medium to a perfusion bioreactor at a first flow rate;

producing, within the perfusion bioreactor, a suspension comprising the at least one cell culture medium and at least a first type of biological cells expressing the at least one biologically-produced product;

measuring a level of the suspension in a reaction chamber of the perfusion bioreactor using a level sensing system;

causing at least a portion of the suspension to flow through at least one filter probe to produce at least one filtrate stream lean in the first type of biological cells, wherein the at least one filtrate stream comprises the at least one biologically-produced product, wherein the at least one filter probe is at least partially submerged in the suspension;

adjusting one or more properties of the at least one filtrate stream to produce an adjusted filtrate stream;

removing, within a purification module, at least a first type of impurity and a second type of impurity from the adjusted filtrate stream to produce a purified filtrate stream flowing at a second flow rate, wherein the purified filtrate stream comprises the at least one biologically-produced product and is lean in the first type of impurity and the second type of impurity relative to the adjusted filtrate stream, wherein producing the purified filtrate stream comprises:

removing, within a first partitioning unit, at least the first type of impurity from the adjusted filtrate stream to produce a first partitioned filtrate stream lean in the first type of impurity relative to the adjusted filtrate stream, wherein the first partitioned filtrate stream comprises the at least one biologically-produced product; and

removing, within a second partitioning unit, at least the second type of impurity from the first partitioned filtrate stream to produce a second partitioned filtrate stream lean in the second type of impurity relative to the first partitioned filtrate stream, wherein the second partitioned filtrate stream comprises the at least one biologically-produced product.

5. The biomanufacturing system of claim 1 or 3, or the method of claim 2 or 4, wherein the first type of biological cells are microbial cells.

6. The biomanufacturing system or method of claim 5, wherein the microbial cells are yeast cells.

7. The biomanufacturing system or method of claim 6, wherein the yeast cells are Pichia Pastoris cells.

8. The biomanufacturing system of any one of claims 1, 3, or 5-7, or the method of any one of claims 2 or 4-7, wherein the at least one biologically-produced product comprises granulocyte-colony stimulating factor (G-CSF), human growth hormone (hGH), and/or interferon α-2β (IFN).

9. The biomanufacturing system of any one of claims 1, 3, or 5-7, or the method of any one of claims 2 or 4-7, wherein the at least one biologically-produced product comprises a single-domain antibody.

10. The biomanufacturing system of any one of claims 1, 3, or 5-9, or the method of any one of claims 2 or 4-9, wherein the purification module comprises:

a first column comprising a multimodal cation exchange resin; and

a second column comprising a resin selected from an anion exchange resin and a hydrophobic charge induction chromatography (HCIC) resin.

11. The biomanufacturing system or method of claim 10, wherein the purification module further comprises a third column comprising a resin selected from an HCIC resin and a cation exchange resin.

12. The biomanufacturing system of any one of claims 1, 3, or 5-11, or the method of any one of claims 2 or 4-11, wherein the purification module is configured to remove a third type of impurity.

13. The biomanufacturing system of any one of claims 1, 3, or 5-12, or the method of any one of claims 2 or 4-12, wherein the first type of impurity and/or the second type of impurity is a host-related impurity.

14. The biomanufacturing system or method of claim 13, wherein the host-related impurity is a host cell protein.

15. The biomanufacturing system of any one of claims 1, 3, or 5-14, wherein the one or more properties the adjustment module is configured to adjust comprise pH, conductivity, product stability, flow rate, and/or pressure.

16. The method of any one of claims 2 or 4-14, wherein adjusting one or more properties of the at least one filtrate stream comprises increasing or decreasing pH, conductivity, product stability, flow rate, and/or pressure of the at least one filtrate stream.

17. The biomanufacturing system of any one of claims 1, 3, or 5-15, further comprising a formulation module, wherein the formulation module comprises a filtration unit, a viral filtration unit, a dilution adjustment unit, and/or a product packaging unit.

18. The biomanufacturing system of any one of claims 1, 3, 5-15, or 17, or the method of any one of claims 2, 4-14, or 16, wherein the level sensing system comprises a magnetic level sensing system.

19. The biomanufacturing system of any one of claims 1, 3, 5-15, or 17, or the method of any one of claims 2, 4-14, or 16, wherein the level sensing system comprises an optical level sensing system.

20. The biomanufacturing system of any one of claims 1, 3, 5-15, or 17, or the method of any one of claims 2, 4-14, or 16, wherein the level sensing system comprises a capacitance-based probe.