SUMMARY

[0005] In some examples, provided herein is a method for automated production of a viral vector, comprising: introducing an engineered viral producer cell into a fully enclosed cell engineering system; transducing the engineered viral producer cell with a vector encoding a gene of interest to produce a transduced viral producer cell; expanding the transduced viral producer cell and producing the viral vector within the transduced viral producer cell; transferring the expanded producer cell to a downstream processing module; and isolating the viral vector; and purifying the viral vector, wherein (a) through (e) are performed in a closed and automated process. In one aspect, the present disclosure refers to a method for automated production of a viral vector, comprising: (a) introducing an engineered viral producer cell into a fully enclosed cell engineering system; (b) transducing the engineered viral producer cell with a vector encoding a gene of interest to produce a transduced viral producer cell; (c) expanding the transduced viral producer cell and producing the viral vector within the expanded viral producer cells; (d) transferring the expanded viral producer cells to a downstream processing module; and (e) isolating the viral vector; and (f) purifying the viral vector, wherein (a) through (e) are performed in a closed and automated process; and wherein the isolating comprises passing the expanded viral producer cells through an elution column.

[0006] Also provided herein is a method for automated production of a viral vector, comprising: introducing a packaging cell into a fully enclosed cell engineering system; transducing the packaging cell with one or more vectors encoding a viral helper gene, a viral packing gene, and a gene of interest to produce a transduced cell; expanding the transduced cell and producing the viral vector within the transduced cell; transferring the expanded cell to a downstream processing module; and isolating the viral vector; and purifying the viral vector, wherein (a) through (e) are performed in a closed and automated process. In one aspect, the present disclosure refers to a method for automated production of a viral vector, comprising: (a) introducing a packaging cell into a fully enclosed cell engineering system; (b) transducing the packaging cell with one or more vectors encoding a viral helper gene, a viral packing gene, and a gene of interest to produce a transduced cell; (c) expanding the transduced cell and producing the viral vector within the expanded cells; (d) transferring the expanded cell to a downstream processing module; and (e) isolating the viral vector; and (f) purifying the viral vector, wherein (a) through (e) are performed in a closed and automated process; and wherein the isolating comprises passing the expanded cells through an elution column.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. 1 shows a flow diagram for the automated production of a viral vector in accordance with embodiments hereof.

[0008] FIG. 2 shows a closed and automated cell engineering system as described in embodiments herein.

[0009] FIG. 3 shows a lab space containing exemplary closed and automated cell engineering systems as described in embodiments herein.

[0010] FIG. 4 shows a diagram of a viral vector production process that can be performed in a cassette of a closed and automated system as described in embodiments herein.

[0011] FIG. 5 shows a flow diagram of a process within an automated cell engineering system as described herein.

CLAIMS

What is claimed is:

1. A method for automated production of a viral vector, comprising:
   (a) introducing an engineered viral producer cell into a fully enclosed cell engineering system;
   (b) transducing the engineered viral producer cell with a vector encoding a gene of interest to produce a transduced viral producer cell;
   (c) expanding the transduced viral producer cell and producing the viral vector within the expanded viral producer cells;
   (d) transferring the expanded viral producer cells to a downstream processing module; and
   (e) isolating the viral vector; and
   (f) purifying the viral vector,
   wherein (a) through (e) are performed in a closed and automated process; and
   wherein the isolating comprises passing the expanded viral producer cells through an elution column.
2. The method of claim 1, wherein the engineered viral producer cell is a mammalian cell.
3. The method of claim 1, wherein the viral vector is an adeno-associated virus (AAV) vector, a lentivirus vector, a retrovirus vector or a baculovirus vector.
4. The method of claim 2, wherein the mammalian cell is a Chinese hamster ovary (CHO) cell.
5. The method of claim 2, wherein the mammalian cell is a human embryonic kidney (HEK) cell.
6. The method of claim 1, wherein the engineered viral producer cell is an insect cell.

7. The method of claim 1, wherein the closed and automated process comprises:

    (a) monitoring with one or more of a temperature sensor, a pH sensor, a glucose sensor, a lactose sensor, an oxygen sensor, a carbon dioxide sensor, and an optical density sensor, and

    (b) automatically adjusting one or more of a temperature, a pH level, a glucose level, a lactose level, an oxygen level, a carbon dioxide level, and an optical density.

8. The method of claim 7, wherein the transducing comprises viral infection, electroporation, liposome transfection, or membrane disruption.

9. The method of claim 8, wherein the purifying comprises a polishing step.

10. A method for automated production of a viral vector, comprising:

    (a) introducing a packaging cell into a fully enclosed cell engineering system;

    (b) transducing the packaging cell with one or more vectors encoding a viral helper gene, a viral packing gene, and a gene of interest to produce a transduced cell;

    (c) expanding the transduced cell and producing the viral vector within the expanded cells;

    (d) transferring the expanded cells to a downstream processing module; and

    (e) isolating the viral vector; and

    (f) purifying the viral vector,

    wherein (a) through (e) are performed in a closed and automated process; and

    wherein the isolating comprises passing the expanded cells through an elution column.

11. The method of claim 10, wherein the packaging cell is a mammalian cell.

12. The method of claim 10, wherein the viral vector is an adeno-associated virus (AAV) vector, a lentivirus vector, a retrovirus vector, or a baculovirus vector.
13. The method of claim 11, wherein the mammalian cell is a Chinese hamster ovary (CHO) cell.
14. The method of claim 11, wherein the mammalian cell is a human embryonic kidney (HEK) cell.
15. The method of claim 10, wherein the packaging cell is an insect cell.
16. The method of claim 10, wherein the closed and automated process comprises:
    (c) monitoring with one or more of a temperature sensor, a pH sensor, a glucose sensor, a lactose sensor, an oxygen sensor, a carbon dioxide sensor, and an optical density sensor, and
    (d) automatically adjusting one or more of a temperature, a pH level, a glucose level, a lactose level, an oxygen level, a carbon dioxide level, and an optical density.
17. The method of claim 16, wherein the transducing comprises viral infection, electroporation, liposome transfection, or membrane disruption.
18. The method of claim 17, wherein the purifying comprises a polishing step.