

Claims:

1. A method for expansion of viral vector producing cells comprising:

supplying a three-dimensional bioreactor comprising a plurality of voids having a surface area for cell expansion, said plurality of voids having a diameter **D**, a plurality of pore openings
5 between said voids having a diameter **d**, such that **D**>**d** and wherein: (a) 90% or more of said voids have a selected void volume (**V**) that does not vary by more than +/- 10.0%; and (b) 90% or more of said pore openings between said voids have a value of **d** that does not vary by more than +/- 10.0%;

seeding said three-dimensional bioreactor with viral vector producing cells;

10 flowing a perfusion medium through said three-dimensional bioreactor and promoting viral vector cell expansion.

2. The method of claim 1 further comprising delivery of a transfection reagent to said viral vector producing cells in said three-dimensional bioreactor and producing a viral vector.

3. The method of claim 2 wherein said viral vector producing cells comprises HEK
15 293T cells and said viral vector comprises a lentiviral vector.

4. The method of claim 1 wherein said voids have a diameter (**D**) of greater than 0.4 mm and said pores have a diameter (**d**) of greater than 0.20 mm.

5. The method of claim 1 wherein said voids have a diameter (**D**) in the range of greater than 0.4 mm to 100.0 mm.

20 6. The method of claim 1 wherein said pores have a diameter (**d**) in the range of 0.2 mm to 10.0 mm.

7. The method of claim 1 wherein 95.0 % or more of said voids indicate a void volume (**V**) that does not vary by more than +/- 10.0%.

8. The method of claim 1 wherein 99.0% to 100% of said voids indicate a void volume
25 (**V**) that does not vary by more than +/- 10.0%.

9. The method of claim 1 wherein 95.0 % or more of said pore openings between said voids have a value of d that does not vary by more than $\pm 10.0\%$.
10. The method of claim 1 wherein 99.0 to 100 % or more of said pore openings between said voids have a value of d that does not vary by more than $\pm 10.0\%$.
- 5 11. The method of claim 1 wherein at least 90.0% of the voids present have 2 pore openings per void.
12. The method of claim 1 wherein at least 90.0% of the voids present have 8 to 12 pore openings per void.
13. The method of claim 1 wherein said voids have an internal concave surface.
- 10 14. The method of claim 1 wherein said voids comprise spherical voids.
15. The method of claim 14 wherein said spherical voids have a packing efficiency of greater than 64.0 % in a 3D cylindrical space.
16. The method of claim 1 wherein said 3D bioreactor is formed from a material that has a Tensile Modulus of at least 0.01 GPa.
- 15 17. The method of claim 1 wherein said 3D bioreactor is formed from a material that is biocompatible.
18. The method of claim 1 wherein said 3D bioreactor is formed from a material not susceptible to hydrolysis during cell expansion such that the amount of hydrolysis does not exceed 5.0 % by weight of the material present.
- 20 19. The 3D bioreactor of claim 1 wherein said bioreactor has a diameter Φ and a height H and the ratio $\Phi:H$ is in the range of greater than 1:1 to 100:1.