We claim:

1. An apparatus comprising an adherent material in a container, which container is disposed within a bioreactor chamber, and a vibrator for imparting a reciprocating motion to the container relative to the bioreactor chamber, the vibrator comprising one or more controls for adjusting amplitude and frequency of the reciprocating motion, wherein the vibrator is configured to vibrate in a manner causing cells attached to the adherent material to detach from the adherent material.

2. The apparatus of claim 1, wherein the adherent material is a 2-dimensional matrix or a 3-dimensional matrix.

3. The apparatus of claim 2, wherein the adherent material is a 3-dimensional matrix.

4. The apparatus of claim 1, wherein the bioreactor is a plug flow bioreactor, a continuous stirred tank bioreactor, a stationary-bed bioreactor, an air-lift bioreactor, or a cell seeding perfusion bioreactor.

5. The apparatus of claim 4, wherein the bioreactor comprises a packed-bed 3-dimensional matrix contained within a basket, and the reciprocating device is configured for reciprocating said basket.

6. The apparatus of claim 3, wherein the 3-dimensional matrix comprises a single-piece scaffold, multiple beads, multiple carriers, microfibers, nanofibers, or combinations thereof.

7. The apparatus of claim 6, wherein the microfibers or nanofibers are woven or non-woven.

8. The apparatus of claim 6, wherein the beads are smooth or porous.

9. The apparatus of claim 3, wherein the 3-dimensional matrix comprises one or more of a polyester, a polypropylene, a polyalkylene, a polyfluorochloroethylene, a polyvinyl chloride, a polyvinyl fluoride resin, a polystyrene, a polysulfone, a polyurethane, a polyethyene terephtalate, a cellulose, a glass fiber, a ceramic particle, a matrigel, an extracellular matrix component, a collagen, a poly L lactic acid, a dextran, an inert metal fiber, silica, natron glass, borosilicate glass, chitosan, or a vegetable sponge.

10. The apparatus of claim 9, wherein the cellulose is cellulose acetate.

11. The apparatus of claim 9, wherein the extracellular matrix component is one or more of fibronectin, vitronectin, chondronectin, or laminin.

12. The apparatus of claim 3, wherein the 3-dimensional matrix is electrostatically charged.

13. The apparatus of claim 3, wherein the 3-dimensional matrix is coated with collagen or gelatin.

14. The apparatus of claim 1, wherein said apparatus is configured for performing said reciprocating motion, and said reciprocating motion is a substantially linear reciprocating motion.

15. The apparatus of claim 14, wherein the reciprocating motion has an amplitude of between about 10 mm to about 750 mm and a frequency of 1 to 6 Hz.

16. The apparatus of claim 15, wherein the duration of the reciprocating motion is about 1 second, 15 seconds, 30 seconds, 1 minute, 2 minutes, 5 minutes, 10 minutes, or 20 minutes.

17. The apparatus of claim 16, wherein the frequency of the reciprocating motion is about 5 Hz and the duration is about 30 seconds or less.

18. The apparatus of claim 16, wherein the frequency of the reciprocating motion is about 1 Hz.

19. The apparatus of claim 15, wherein the amplitude is about 25 mm.

20. The apparatus of claim 1, wherein the container has a head plate.

21. The apparatus of claim 1, wherein the bioreactor contains one or more packed carriers.

22. The apparatus of claim 1, wherein the vibrator imparts a reciprocating motion to the adherent material by moving the container which contains the adherent material relative to the bioreactor chamber.

23. The apparatus of claim 1, wherein said container is operably linked to said vibrator.

24. The apparatus of claim 23, wherein said vibrator is disposed exterior to said bioreactor chamber, and said container is operably linked to said vibrator via a part that transverses an exterior barrier of said bioreactor chamber.

25. The apparatus of claim 24, wherein said part passes through an opening in said exterior barrier, and said opening is covered with a flexible seal.

26. The apparatus of claim 1, wherein said apparatus is configured for reciprocating said packed bed while maintaining said packed bed in a substantially static condition.

27. The apparatus of claim 14, wherein said container has external dimensions, measured cross-sectionally to said substantially linear reciprocating motion, that are smaller than internal dimensions of said bioreactor chamber.

28. The apparatus of claim 1, wherein said container is substantially cylindrical and comprises a wall located perpendicularly to a top screen and a bottom screen, each screen having perforations therein.

29. The apparatus of claim 1, wherein said container and said bioreactor chamber are configured to jointly form a seal between a perimeter of said container and an inner surface of said bioreactor vessel.

30. The apparatus of claim 6, wherein the 3-dimensional matrix comprises microfibers or nanofibers.

31. The apparatus of claim 14, wherein the reciprocating motion comprises a frequency of 2 to 5 Hz.

32. A method for harvesting cells grown in culture within an apparatus comprising i) an adherent material in a container, which container is disposed within a bioreactor chamber, and ii) a vibrator for imparting a reciprocating motion to the container relative to the bioreactor chamber, the vibrator

comprising one or more controls for adjusting amplitude and frequency of the reciprocating motion, wherein the vibrator is configured to vibrate in a manner causing cells attached to the adherent material to detach from the adherent material, the method comprising:
a) growing the cells on the adherent material, wherein the cells are attached to the adherent material;
b) exposing the cells in the container to a dissociating agent;
c) causing the vibrator to vibrate the adherent material in the container for a period of time at a frequency and amplitude sufficient to release the cells from the adherent material; and
d) recovering the cells.

33. The method of claim 32, further comprising vibrating the adherent material for a period of time at a frequency and amplitude sufficient to flush the released cells from the material.

34. The method of claim 32, wherein the adherent material provides a 2-dimensional surface to which the cells attach.

35. The method of claim 32, wherein the adherent material provides a 3-dimensional matrix to which the cells attach.

36. The method of claim 35, wherein the 3-dimensional matrix is enclosed in a packed bed within a bioreactor.

37. The method of claim 35, wherein the 3-dimensional matrix comprises a single-piece scaffold, multiple beads, multiple carriers, microfibers, nanofibers, or combinations thereof.

38. The method of claim 37, wherein the microfibers or nanofibers are woven.

39. The method of claim 37, wherein the beads are smooth or porous.

40. The method of claim 37, wherein the microfibers or nanofibers are non-woven.

41. The method of claim 35, where the adherent material comprises one or more of a polyester, a polypropylene, a polyalkylene, a polyfluorochloroethylene, a polyvinyl chloride, a polyvinyl fluoride resin, a polystyrene, a polysulfone, a polyurethane, a polyethyene terephtalate, a cellulose, a glass fiber, a ceramic particle, a matrigel, an extracellular matrix component, a collagen, a poly L lactic acid, a dextran, an inert metal fiber, silica, natron glass, borosilicate glass, chitosan, or a vegetable sponge.

42. The method of claim 41, wherein the cellulose is cellulose acetate.

43. The method of claim 41, wherein the extracellular matrix component is one or more of fibronectin, vitronectin, chondronectin, or laminin.

44. The method of claim 40, wherein the adherent material is electrostatically charged.

45. The method of claim 40, wherein the adherent material is coated with collagen or gelatin.

46. The method of claim 32, wherein the dissociating agent is trypsin, papain, elastase, hyaluronidase, collagenase type 1, collagenase type 2, collagenase type 3, collagenase type 4, dispase, or a

combination thereof.

47. The method of claim 46, wherein the trypsin is recombinant trypsin.

48. The method of claim 32, wherein the adherent cells are human cells.

49. The method of claim 32, wherein the adherent cells are adherent stromal cells.

50. The method of claim 49, wherein the origin of the adherent stromal cells is placenta, adipose tissue, or bone marrow.

51. The method of claim 32, wherein the adherent material is vibrated by a substantially linear reciprocating motion.

52. The method of claim 51, wherein the amplitude of the substantially linear reciprocating motion is a distance that is 15-100% of the height of a basket containing the adherent material.

53. The method of claim 51, wherein the reciprocating motion has an amplitude of between about 10 mm to about 750 mm and a frequency of 1 to 6 Hz.

54. The method of claim 53, wherein the duration of the reciprocating motion is from about 1 second, 15 seconds, 30 seconds, 1 minute, 2 minutes, 5 minutes, 10 minutes, or 20 minutes.

55. The method of claim 54, wherein the frequency of the reciprocating motion is about 5 Hz and the duration is about 30 seconds or less.

56. The method of claim 54, wherein the amplitude is about 25 mm.

57. The method of claim 32, wherein the harvested cells are characterized by one or more of:
a) at least 50% cell viability;
b) at least 50% harvest efficiency;
c) a vitality index of less than or equal to 0.5; or
d) a heterogeneous cell population.