WHAT IS CLAIMED IS:

1. A method of culturing, expanding or growing stem or stem-like cells or induced pluripotent stem cells on a surface, comprising attaching the cells to the surface through a ligand that binds to the surface and the cells.

2. The method according to claim 1, wherein the ligand binds to the surface directly or indirectly through an intermediary.

3. The method according to claim 2, wherein the intermediary is a chemical linker or another protein or a combination thereof.

4. The method according to claim 3, wherein the protein is protein A or protein G.

5. The method according to claim 3, wherein the linker is photo or chemically sensitive.

6. The method according to claim 2, wherein the ligand or the intermediary is non-specifically adsorbed to the surface, or is covalently coupled or attached to the surface through an affinity tag-binding partner interaction.

7. The method according to claim 1, wherein the ligand is linked to a polymer.

8. The method according to claim 1, wherein the ligand specifically binds to a polypeptide that is expressed on the stem or stem-like cells or induced pluripotent stem cells.

9. The method according to claim 1, wherein the ligand is an antibody or a growth factor.

10. The method according to claim 8, wherein the polypeptide on the surface of the cell is MUC1 or MUC1*, SSEA3, SSEA4, Tra 1-81 or Tra 1-60.

11. The method according to claim 10, wherein the polypeptide on the surface of the cell is MUC1*.

12. The method according to claim 9, wherein the antibody specifically binds to PSMGFR or C-10 PSMGFR.

13. The method according to claim 9, wherein the growth factor is wild-type NM23, or NM23-S120G mutant, or bFGF.

14. A method for culturing stem or stem-like cells or induced pluripotent stem cells, wherein the cells are exposed to a medium containing agents that bind to a peptide having the sequence of PSMGFR.

15. The method according to claim 14, wherein the agent is an antibody.

16. The method according to claim 14, wherein the agent is wild-type NM23 or NM23-S120G mutant.

17. A method of culturing stem or stem-like cells or induced pluripotent stem cells comprising exposing the cells to medium containing agents secreted from MUC1*-positive cancer cells.

18. The method according to claim 17, wherein the MUC1*-positive cells are selected from T47D, ZR-75-30, or ZR-75-1.

19. A method of culturing stem or stem-like cells or induced pluripotent stem cells comprising exposing the cells to conditioned media from MUC1*-positive cancer cells.

20. The method according to claim 19, wherein the MUC1*-positive cells are selected from T47D, ZR-75-30, or ZR-75-1.

21. The method according to claim 1, wherein the surface is not matrigel.

22. The method according to claim 1, wherein the cell is cultured without fibroblast feeder cells.

23. The method according to claim 1, wherein the cell is removed from the surface without manual dissection.

24. A method of harvesting cells from cells grown according to the method of claim 1, comprising adding a competing molecule that binds to the ligand so that the cells are released from binding to the ligand or the surface.

25. A method of harvesting cells from cells grown according to the method of claim 1, comprising cleaving a linker bound to the surface that is directly or indirectly attached to the cells, so that the cells are released from the surface.

26. A method of identifying state of differentiation of cells comprising using anti-MUC1* antibody to bind to the cells, wherein positive signal for anti-MUC1* antibody indicates puripotent cell state, and cells showing binding to non-clipped MUC1 indicates differentiated cell state.

27. The method according to claim 26, comprising separating cells from a mixed population of stem and stem-like cells or induced pluripotent stem cells and newly differentiating cells, comprising using anti-MUC1* antibody to bind to the cells, wherein positive signal for anti-MUC1* antibody indicates a pluripotent cell state, and cells showing binding to non-clipped MUC1 indicates differentiated cell state.

28. The method according to claim 27, further comprising contacting the cells with antibodies to stem or stem-like cell or induced pluripotent stem cell markers, wherein positive signal for a stem or stem-like cell or induced pluripotent stem cell marker indicates the presence of pluripotent stem cell state.

29. The method according to claim 28, wherein the cells are contacted with anti-MUC1* and anti-Tra 1-81, anti-Tra 1-60, SSEA3 or SSEA4 antibodies.

30. A method of detecting cancer stem cells using anti-MUC1* antibody to bind to the cells, wherein positive signal for anti-MUC1* antibody indicates cancer stem cells.

31. The method according to claim 30, comprising reacting the cells with antibodies to stem cell markers, wherein positive signal for a stem cell marker indicates the presence of cancer stem cells.

32. A method of modulating culturing, expanding or growing and inhibiting differentiation of stem or stem-like cells or induced pluripotent stem cells on a surface, comprising attaching the cells to the surface directly or indirectly through a ligand that binds to the cells, and exposing the cells to a medium containing agents that bind to a peptide having the sequence of PSMGFR.

33. The method according to claim 32, wherein the agent dimerizes MUC1* to promote growth and inhibit differentiation.

34. The method according to claim 32, wherein the agent inhibits dimerization of MUC1* to promote differentiation.

35. A method of separating cell types, comprising

creating a spatial address on a surface for a variety of ligands having affinity for a different cell type or for specific markers that identify a cell stage or type; and

adding the cells to the surface, wherein the cells are spatially separated depending on which ligand the cells bind.

36. The method according to claim 35, wherein the surface is a particle.

37. The method according to claim 36, wherein the particle is nanoparticle.

38. A method of implanting into a host body, a surface having ligands attached that are ligands of stem or stem-like cells or induced pluripotent stem cells.

39. The method according to claim 38, wherein the host is a patient.

40. The method according to claim 38, wherein the ligands are growth factors for the host's stem or stem-like cells or induced pluripotent stem cells.

41. A method of implanting into a host body, a surface having cells attached through ligands that bind to the surface and the cells.

42. A method of proliferating stem or stem-like cells or induced pluripotent stem cells *in vivo*, comprising administering to a host body a surface having ligands attached that are ligands of stem or stem-like cells or induced pluripotent stem cells.

43. A composition comprising:

a surface on which is bound protein A or protein G via an affinity interaction, wherein the protein A or protein G is bound to an antibody specific for a polypeptide expressed specifically on a stem or stem-like cell or induced pluripotent stem cell, and

a MUC1* dimerizing agent.

44. The composition according to claim 43, wherein the affinity interaction is via NTA-Ni interaction to the surface.

45. The composition according to claim 43, wherein the polypeptide is MUC1 or MUC1*, SSEA3, SSEA4, Tra 1-81 or Tra 1-60.

46. The composition according to claim 43, wherein the MUC1* dimerizing agent is wild-type NM23 or NM23-S120G mutant.

47. A method of proliferating stem or stem-like or induced pluripotent stem cell, comprising:

interacting a surface on which is bound protein A or protein G via an affinity interaction, wherein the protein A or protein G is bound to an antibody specific for a polypeptide expressed specifically on a stem or stem-like cell or induced pluripotent stem cell, with a sample containing the cells with a MUC1* dimerizing agent.

48. The method according to claim 14, wherein the medium is minimal medium.

What is claimed is:

1. A method of culturing, proliferating or growing stem cells, or stem-like cells or induced pluripotent stem cells on a surface, comprising

a. exposing the embryonic stem cells, embryonic stem-like cells, or induced pluripotent stem cells to a surface coated with a Muc1 or Muc1* ligand;

b. adding medium, and

c. culturing the exposed cells.

2. The method according to claim 1, wherein the surface is a membrane or a porous surface.

3. The method according to claim 1, wherein the surface is further coated with extracellular matrix or a component of extracellular matrix.

4. The method according to claim 3, wherein the component of extracellular matrix is RGD sequence containing peptides, poly-Lysine, collagen, or laminin.

5. The method according to claim 3, wherein the extracellular matrix is Matrigel™ or Matrigel™-like substance.

6. The method according to claim 1, wherein the ligand binds to the surface directly or indirectly through an intermediary.

7. The method according to claim 6, wherein the intermediary is a chemical linker or another protein or a combination thereof.

8. The method according to claim 7, wherein the protein is protein A or protein G.

9. The method according to claim 7, wherein the linker is photo or chemically sensitive.

10. The method according to claim 6, wherein the ligand or the intermediary is non-specifically adsorbed to the surface, or is covalently coupled or attached to the surface through an affinity tag-binding partner interaction.

11. The method according to claim 1, wherein the ligand is linked to a polymer.

12. The method according to claim 1, wherein the ligand is an antibody or a growth factor.

13. The method according to claim 12, wherein the antibody specifically binds to PSMGFR or C-10 PSMGFR.

14. The method according to claim 12, wherein the growth factor is wild-type NM23, or NM23-S120G mutant, or bFGF.

15. The method according to claim 1, wherein the surface is not Matrigel™.

16. The method according to claim 1, wherein the cell is cultured without fibroblast feeder cells.

17. The method according to claim 1, wherein the cell is removed from the surface without manual dissection.

18. A method of culturing, proliferating or growing stem cells, or stem-like cells or induced pluripotent stem cells on a surface, comprising

a. exposing the embryonic stem cells, embryonic stem-like cells or induced pluripotent stem cells to a surface coated with an extracellular matrix or a component of extracellular matrix;

b. adding medium containing a Muc1 or Muc1* ligand; and

c. culturing the exposed cells,

wherein the cells remain undifferentiated.

19. The method according to claim 18, wherein the ligand is an antibody.

20. The method according to claim 18, wherein the ligand is wild-type NM23 or NM23-S120G mutant.

21. The method according to claim 18, wherein the surface is not Matrigel™.

22. The method according to claim 18, wherein the cell is cultured without fibroblast feeder cells.

23. The method according to claim 18, wherein the cell is removed from the surface without manual dissection.

24. The method according to claim 18, wherein the surface is a membrane or a porous surface.

25. The method according to claim 18, wherein the component of extracellular matrix is RGD sequence containing peptides, poly-Lysine, collagen or laminin.

26. The method according to claim 18, wherein the extracellular matrix is Matrigel™or Matrigel™-like substance.

27. A method of culturing, proliferating or growing stem cells, or stem-like cells or induced pluripotent stem cells on a surface, comprising

culturing the embryonic stem cells, embryonic stem-like cells or induced pluripotent stem cells in MUC1*-positive cell conditioned media, wherein the cells remain undifferentiated.

28. The method according to claim 27, wherein the MUC1*-positive cells are cancer cells.

29. The method according to claim 28, wherein the MUC1*-positive cells are selected from T47D, ZR-75-30, or ZR-75-1.

30. The method according to claim 27, wherein the surface is a membrane or a porous surface.

31. The method according to claim 27, wherein the surface is coated with an extracellular matrix or a component of extracellular matrix.

32. The method according to claim 31, wherein the component of extracellular matrix is RGD sequence containing peptides, poly-Lysine, collagen or laminin.

33. The method according to claim 31, wherein the extracellular matrix is Matrigel™ or Matrigel™-like substance.

34. The method according to claim 27, wherein the surface is not Matrigel™.

35. The method according to claim 27, wherein the cell is cultured without fibroblast feeder cells.

36. The method according to claim 27, wherein the cell is removed from the surface without manual dissection.