

WHAT IS CLAIMED IS:

1. A product of manufacture comprising:
a solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate substantially comprising a surface, a coat or a coating that prevents or inhibits cell attachment or is
5 unable to sustain cell attachment, and the surface, coat or coating comprises a plurality of spots or circumscribed areas capable of having a cell or cells attached thereto,
wherein optionally the surface, coat or coating preventing or inhibiting cell attachment comprises a polyacrylamide or a hydrogel, or a polyacrylamide-coated or hydrogel-coated surface,
10 and optionally the surface of the solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate comprising a surface, coat or coating is a polyacrylamide-coated or hydrogel-coated glass or glass slide,
and optionally hydrogel-coated glass or glass slide are dehydrated before the spotting or printing,
15 and optionally the solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate comprises or consists of a glass or equivalent, and optionally the polyacrylamide or hydrogel are crosslinked onto a silane activated glass or glass slide;
and optionally the plurality of spots or circumscribed areas capable of having a cell or cells attach thereto comprises one or more compositions or mixtures of
20 compositions capable of facilitating, initiating and/or sustaining attachment of the cells to the plurality of spots or circumscribed areas (and optionally the spot or circumscribed area comprising the one or more compositions capable of facilitating, initiating and/or sustaining attachment of the cells has the one or more compositions directly attached to the solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate, rather than on the
25 surface, coat or coating preventing or inhibiting cell attachment),
and optionally the one or more compositions capable of facilitating, initiating and/or sustaining attachment of the cells comprises one or more extracellular-matrix proteins, or an extracellular-matrix-like composition or mixture of molecules, e.g., such as an interlocking mesh of fibrous proteins and glycosaminoglycans (GAGs), or
30 proteoglycans (PG), heparan sulfate (HS), chondroitin sulfates (CS), keratan sulfate (KS), hyaluronic acid, collagen, elastin, fibronectin, laminin, a Cell Adhesion Molecule (CAM)

or a CAM ligand, an integrin, a cadherin, a selectin, an addressin, or a mixture thereof, or equivalents thereof, or a mixture thereof, or equivalents thereof,

and optionally the cell is a mammalian cell or a human cell,

and optionally the product of manufacture comprises or consists of, or is

5 manufactured as, an array or microarray.

2. A product of manufacture made by a method comprising:

(a) providing a compound, a drug, a small molecule, or a small molecule drug, and a monomer solution capable of polymerizing;

10 (b) providing a solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate;

(c) (i) mixing the compound, drug, small molecule or small molecule drug and the monomer solution, and optionally also including (or mixing in) a second solution or a composition capable of initiating and/or catalyzing polymerization of the monomer, and spotting or printing the mixture onto a plurality of circumscribed areas (such as spots) on
15 the surface of the solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate, or

(ii) spotting or printing the compound, drug, small molecule or small molecule drug onto a plurality of circumscribed areas (such as spots) on the surface of the solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate, followed by spotting or printing a monomer solution capable of polymerizing over (on top of) substantially each spotted or
20 printed compound, drug, small molecule or small molecule drug spot or print, wherein optionally:

(3) the monomer solution initially comprises a second solution or composition capable of initiating and/or catalyzing polymerization of the monomer, and the monomer solution polymerizes after the spotting or printing step,
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(4) a second solution or composition capable of initiating and/or catalyzing polymerization of the monomer is spotted or printed over (on top of) substantially each spotted or printed compound, drug, small molecule or small molecule drug spot or print to initiate or catalyze polymerization of the monomer, or
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(iii) spotting or printing the compound, drug, small molecule or small molecule drug onto a plurality of circumscribed areas (such as spots) on the surface of the solid,

semi-solid, gel or gel-like, colloidal or sol-gel substrate, and the monomer solution is induced to polymerize by an external source, for example, by exposure to a light radiation, such as ultraviolet light, or heat;

5 wherein optionally the circumscribed, spotted or printed area for each compound, drug, small molecule or small molecule drug is approximately between about 0.01 mm² and 0.05 mm², or is approximately between about 0.02 mm² and 0.04mm², or is approximately 0.03 mm²;

and optionally the spotting or printing of the mixture or monomer is done with an ink-jet printer or equivalent, or a liquid handling robot,

10 and optionally the compound, drug, small molecule or small molecule-mixture solution is prepared at a desired concentration and/or mixed with a pre-polymer solution or prepared in encapsulating lipids, liposomes or particles or nano-encapsulating particles,

and optionally the solution can be directly printed onto the dehydrated gel slides using a microarray robot; or the compound, drug, small molecule or small molecule drug
15 /pre-polymer or the encapsulated compound, drug, small molecule or small molecule drug solution can be printed onto the dehydrated gel slides,

and optionally the product of manufacture comprises or consists of, or is manufactured as, an array or microarray.

20 3. A product of manufacture comprising a combination of, or a plurality of, products of manufacture of claim 1 and/or claim 2.

4. The product of manufacture of claim 2, further comprising a substrate surface made by a method comprising spotting or printing one or more compositions
25 capable of facilitating, initiating and/or sustaining attachment of the cells to the plurality of spots, prints or circumscribed areas, and optionally the one or more compositions capable of facilitating, initiating and/or sustaining attachment of the cells comprises one or more extracellular-matrix proteins, or an extracellular-matrix-like composition or mixture of molecules, e.g., such as an interlocking mesh of fibrous proteins and
30 glycosaminoglycans (GAGs), or proteoglycans (PG), heparan sulfate (HS), chondroitin sulfates (CS), keratan sulfate (KS), hyaluronic acid, collagen, elastin, fibronectin, laminin, a Cell Adhesion Molecule (CAM) or a CAM ligand, an integrin, a cadherin, a

selectin, an addressin, or a mixture thereof, or equivalents thereof, or a mixture thereof, or equivalents thereof.

5 5. The product of manufacture of claim 4, further comprising placing or
spotting or printing a cell or a plurality of cells to the plurality of spots, prints or
circumscribed areas having layered thereon one or more compositions capable of
facilitating, initiating and/or sustaining attachment of the cells.

6. A method for determining if a compound, drug, small molecule or small
10 molecule drug has any or a desired effect or cellular response on a cell comprising:
 (a) measuring or observing a cell (e.g., for any or a desired effect or cellular
response on the cell) on a (“test”) product of manufacture (e.g., array, microarray) of any
of claims 1 to 5 (wherein the product of manufacture comprises a compound, drug, small
molecule or small molecule drug);

15 and optionally comparing the same cell on a “control” product of manufacture
which is the same as a product of manufacture of any of claims 1 to 5 except that the
“control” product of manufacture comprises: no compound, drug, small molecule or small
molecule drug; a different compound, drug, small molecule or small molecule drug; a
compound, drug, small molecule or small molecule drug known to have a different effect
20 on the cell; or, the same compound, drug, small molecule or small molecule drug as on
the “test” product of manufacture but at a different concentration;

 (b) the method of (a), wherein the any or a desired effect or cellular response on a
cell comprises cell death (e.g., apoptosis), secretion of a bio-molecule (e.g., proteins,
lipids, polysaccharides, nucleic acids and the like), proliferation (e.g., mitosis), cell-cell
25 interaction, cell surface polypeptide turnover or recycling, vesicle release, membrane
depolarization, ion (e.g., sodium, calcium or potassium) intracellular fluctuations or
movement across cell membranes, and the like.

WHAT IS CLAIMED IS:

1. A product of manufacture fabricated for use as an array or a microarray, made by a method comprising:

- (a) providing a compound, a drug, a small molecule, or a small molecule drug, and a monomer solution capable of polymerizing;
- (b) providing a solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate substantially comprising a surface, a coat or a coating that prevents or inhibits cell attachment or is unable to sustain cell attachment;
- (c)
 - (i) mixing the compound, drug, small molecule or small molecule drug and the monomer solution, and spotting or printing the mixture onto a plurality of circumscribed areas or spots on the surface of the solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate having the surface, coat or coating that prevents or inhibits cell attachment or is unable to sustain cell attachment, or
 - (ii) spotting or printing the compound, drug, small molecule or small molecule drug onto a plurality of circumscribed areas or spots on the surface of the solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate having the surface, coat or coating that prevents or inhibits cell attachment or is unable to sustain cell attachment, followed by spotting or printing a monomer solution capable of polymerizing over or on top of substantially each spotted or printed compound, drug, small molecule or small molecule drug spot or print, or
 - (iii) spotting or printing the compound, drug, small molecule or small molecule drug onto a plurality of circumscribed areas or spots on the surface of the solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate having the surface, coat or coating that prevents or inhibits cell attachment or is unable to sustain cell attachment, and the monomer solution is induced to polymerize by an external source, for example, by exposure to a light radiation, such as ultraviolet light, or heat; and
- (d) providing a cell-attaching material, and printing the cell-attaching material, or one or more compositions capable of facilitating, initiating and/or sustaining attachment of the cells, on top of each circumscribed area or spot.

2. The product of manufacture according to claim 1, wherein the surface, coat or coating that prevents or inhibits cell attachment or is unable to sustain cell attachment comprises a polyacrylamide or a hydrogel, or the solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate comprises a silane-activated glass slide coated with the polyacrylamide or the hydrogel.
3. The product of manufacture according to claim 1 or 2, wherein step c(i) further comprises also including or mixing in a second solution or a composition capable of initiating and/or catalyzing polymerization of the monomer.
4. The product of manufacture according to any one of claims 1 to 3, wherein in step c(ii):
 - (1) the monomer solution initially comprises a second solution or composition capable of initiating and/or catalyzing polymerization of the monomer, and the monomer solution polymerizes after the spotting or printing step, or
 - (2) a second solution or composition capable of initiating and/or catalyzing polymerization of the monomer is spotted or printed over or on top of substantially each spotted or printed compound, drug, small molecule or small molecule drug spot or print to initiate or catalyze polymerization of the monomer.
5. The product of manufacture according to any one of claims 1 to 4, wherein the cell-attaching material, or the one or more compositions capable of facilitating, initiating and/or sustaining attachment of the cells, comprises: an extracellular-matrix protein or an extracellular-matrix-like composition or mixture of molecules; an interlocking mesh of fibrous proteins and glycosaminoglycans (GAGs); a proteoglycan (PG), a heparan sulfate (HS), a chondroitin sulfate (CS), a keratan sulfate (KS), a hyaluronic acid, a collagen, an elastin, a fibronectin, a laminin, a Cell Adhesion Molecule (CAM) or a CAM ligand, an integrin, a cadherin, a selectin, an addressin, or a mixture thereof, or equivalents thereof.

6. The product of manufacture according to any one of claims 1 to 5, wherein the circumscribed, spotted or printed area for each compound, drug, small molecule or small molecule drug is approximately between about 0.01 mm² and 0.05 mm².
7. The product of manufacture according to claim 6, wherein the circumscribed, spotted or printed area for each compound, drug, small molecule or small molecule drug is approximately between about 0.02 mm² and 0.04mm².
8. The product of manufacture according to claim 7, wherein the circumscribed, spotted or printed area for each compound, drug, small molecule or small molecule drug is approximately 0.03 mm²
9. The product of manufacture according to any preceding claim wherein the spotting or printing of the mixture or monomer is done with an ink-jet printer or equivalent, or a liquid handling robot.
10. The product of manufacture according to any preceding claim, wherein the compound, drug, small molecule or small molecule-mixture solution is prepared at a desired concentration and/or mixed with a pre-polymer solution or prepared in encapsulating lipids, liposomes or particles or nano-encapsulating particles.
11. The product of manufacture according to any preceding claim, wherein the solution can be directly printed using a microarray robot; or the compound, drug, small molecule or small molecule drug /pre-polymer or the encapsulated compound, drug, small molecule or small molecule drug solution can be printed onto the dehydrated gel slides.
12. The product of manufacture according to any preceding claim, wherein the product of manufacture comprises or consists of, or is manufactured as, an array or microarray.
13. The product of manufacture according to any preceding claim, wherein the product of manufacture further comprises a cell or a plurality of cells, or human cells animal cells or cultured cells, layered onto the cell-attaching material, or the one or

more compositions capable of facilitating, initiating and/or sustaining attachment of the cells.

14. A product of manufacture fabricated for use as an array or a microarray comprising:

a solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate substantially comprising a surface, a coat or a coating that prevents or inhibits cell attachment or is unable to sustain cell attachment, and the surface, coat or coating comprises a plurality of spots or circumscribed areas capable of having a cell or a plurality of cells attached thereto, wherein the plurality of spots or circumscribed areas comprises:

a first layer comprising a polymerized monomer mixed with a compound, a drug, a small molecule, or a small molecule drug, and

a second layer positioned or placed over the first layer, wherein the second layer comprises a cell-attaching material, or one or more compositions capable of facilitating, initiating and/or sustaining attachment of the cells,

and the cell-attaching material, or the one or more compositions capable of facilitating, initiating and/or sustaining attachment of the cells comprises an extracellular-matrix protein or an extracellular-matrix-like composition or mixture of molecules; an interlocking mesh of fibrous proteins and glycosaminoglycans (GAGs); a proteoglycan (PG), a heparan sulfate (HS), a chondroitin sulfate (CS), a keratan sulfate (KS), a hyaluronic acid, a collagen, an elastin, a fibronectin, a laminin, a Cell Adhesion Molecule (CAM) or a CAM ligand, an integrin, a cadherin, a selectin, an addressin, or a mixture thereof, or equivalents thereof.

15. The product of manufacture of claim 14, wherein

(i) the surface, coat or coating preventing or inhibiting cell attachment comprises a polyacrylamide or a hydrogel, or a polyacrylamide-coated or hydrogel-coated surface, or

(ii) the surface of the solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate comprising a surface, coat or coating is a polyacrylamide-coated or hydrogel-coated glass or glass slide, or

(iii) hydrogel-coated glass or glass slide are dehydrated before the spotting or printing, or

- (iv) the solid, semi-solid, gel or gel-like, colloidal or sol-gel substrate comprises or consists of a glass or equivalent, or
- (v) the polyacrylamide or hydrogel are crosslinked onto a silane activated glass or glass slide.

16. A product of manufacture fabricated for use as an array or a microarray comprising a combination of, or a plurality of, products of manufacture of:

- (a) any of claims 1 to 13; and/or
- (b) any of claims 14 to 15.

17. A method for determining if a compound, drug, small molecule or small molecule drug has any or a desired effect or cellular response on human cells, animal cells, or cultured cells comprising:

- (a) (i) providing a product of manufacture comprising a combination of, or a plurality of, products of manufacture of claims 1 to 16,

wherein the a product of manufacture comprises a cell or a plurality of cells layered onto the cell-attaching material or the one or more compositions capable of facilitating, initiating and/or sustaining attachment of the cells, and

- (ii) measuring or observing the cell or plurality of cells for any or for a desired effect or cellular response on the cell, on the product of manufacture, and comparing the same cell on a “control” product of manufacture which is the same as a product of manufacture of any of claims 1 to 14 except that the “control” product of manufacture comprises: no compound, drug, small molecule or small molecule drug; a different compound, drug, small molecule or small molecule drug; a compound, drug, small molecule or small molecule drug known to have a different effect on the cell; or, the same compound, drug, small molecule or small molecule drug as on the “test” product of manufacture but at a different concentration; or

- (b) the method of (a), wherein the any or a desired effect or cellular response on a cell comprises cell death or apoptosis, secretion of a bio-molecule, wherein the biomolecules comprises proteins, lipids, polysaccharides, nucleic acids and the like, proliferation or mitosis, cell-cell interaction, cell surface polypeptide turnover or recycling, vesicle release,

membrane depolarization, ion intracellular fluctuations or movement across cell membranes.