CLAIMS

What is claimed is:

1. A cell culture article for culturing stem cell-derived cardiomyocytes in a chemically defined medium, comprising:

a substrate having a surface;

a polymer material disposed on the surface, wherein the polymer material comprises

(i) a homopolymer formed from tetra(ethylene glycol) diacrylate, glycerol dimethacrylate, triethylene glycol dimethacrylate, 1,4-butanediol dimethacrylate, or poly(ethylene glycol) diacrylate, or

(ii) a copolymer formed from

tetra(ethylene glycol) diacrylate and 1,4-butanediol dimethacrylate,

glycerol dimethacrylate and tetra(ethylene glycol) diacrylate,

glycerol dimethacrylate and tri(ethylene glycol) dimethacrylate,

glycerol dimethacrylate and 1,4-butanediol dimethacrylate,

glycerol dimethacrylate and poly(ethylene glycol) diacrylate,

triethylene glycol dimethacrylate and 1,4-butanediol dimethacrylate,

poly(ethylene glycol) diacrylate and tetra(ethylene glycol) diacrylate,

di(ethylene glycol) dimethacrylate and tetraethylene glycol dimethacrylate,

tetra(ethylene glycol) diacrylate and trimethylolpropane triacrylate,

trimethylolpropane triacrylate and neopentyl glycol ethoxylate diacrylate,

di(ethylene glycol) dimethacrylate and tetra(ethylene glycol) diacrylate,

di(ethylene glycol) dimethacrylate and tri(ethylene glycol) dimethacrylate,

di(ethylene glycol) dimethacrylate and neopentyl glycol dimethacrylate,

tetra(ethylene glycol) dimethacrylate and tri(ethylene glycol) dimethacrylate,

tetra(ethylene glycol) dimethacrylate and 1,4-butanediol dimethacrylate,

tetra(ethylene glycol) dimethacrylate and 1,6-hexanediol ethoxylate diacrylate,

1,6-hexanediol propoxylate diacrylate and poly(ethylene glycol) diacrylate,

1,6-hexanediol propoxylate diacrylate and trimethylolpropane benzoate diacrylate,

1,6-hexanediol propoxylate diacrylate and trimethylolpropane ethoxylate (1 EO/OH) methyl diacrylate,

1,6-hexanediol propoxylate diacrylate and 1,6-hexanediol ethoxylate diacrylate

neopentyl glycol diacrylate and trimethylolpropane ethoxylate (1 EO/OH) methyl diacrylate, or

neopentyl glycol diacrylate and 1,6-hexanediol ethoxylate diacrylate.

2. The article of claim 1, wherein the polymer material comprises a homopolymer formed from tetra(ethylene glycol) diacrylate or glycerol dimethacrylate or a copolymer formed from (i) di(ethylene glycol) dimethacrylate and neopentyl glycol dimethacrylate, (ii) glycerol dimethacrylate and tri(ethylene glycol) dimethacrylate, (iii) glycerol dimethacrylate and 1,4-butanediol dimethacrylate, (iv) tetra(ethylene glycol) diacrylate and trimethylolpropane triacrylate.

3. The article of claim 1, wherein the polymer material consists essentially of a homopolymer formed from tetra(ethylene glycol) diacrylate or glycerol dimethacrylate or a copolymer formed from (i) di(ethylene glycol) dimethacrylate and neopentyl glycol dimethacrylate, (ii) glycerol dimethacrylate and tri(ethylene glycol) dimethacrylate, (iii) glycerol dimethacrylate and 1,4-butanediol dimethacrylate, (iv) tetra(ethylene glycol) diacrylate and trimethylolpropane triacrylate.

4. The article of claim 1, wherein the polymer material disposed on the surface of the article has a surface area greater than about $5mm^2$.

5. The article of claim 1, wherein the article is produced by a process of:

diluting one or more monomers in a volatile organic solvent;

depositing the diluted monomers on the substrate surface of the article;

evaporating substantially all of the solvent; and

polymerizing the monomers to form the polymer layer attached to the surface.

6. The article of claim 6, wherein the volatile solvent is ethanol.

7. The article of claim 1, further comprising a well, wherein the surface of the substrate on which the polymer material is disposed is in the well.

8. The article of claim 1, wherein the article is selected from the group consisting of a multi-well plate, a petri dish, a beaker, a tube, and a flask.

9. A culture of a stem cell-derived cardiomyocyte, comprising:

an article comprising a polymeric material disposed on a surface;

the stem cell-derived cardiomyocyte disposed on the polymer material; and

a culture medium in which the stem cell-derived cardiomyocyte is cultured,

wherein the polymer material comprises a

(i) homopolymer formed from tetra(ethylene glycol) diacrylate, glycerol dimethacrylate, triethylene glycol dimethacrylate, 1,4-butanediol dimethacrylate, or poly(ethylene glycol) diacrylate, or

(ii) a copolymer formed from

tetra(ethylene glycol) diacrylate and 1,4-butanediol dimethacrylate,

glycerol dimethacrylate and tetra(ethylene glycol) diacrylate,

glycerol dimethacrylate and tri(ethylene glycol) dimethacrylate,

glycerol dimethacrylate and 1,4-butanediol dimethacrylate,

glycerol dimethacrylate and poly(ethylene glycol) diacrylate,

triethylene glycol dimethacrylate and 1,4-butanediol dimethacrylate,

poly(ethylene glycol) diacrylate and tetra(ethylene glycol) diacrylate,

di(ethylene glycol) dimethacrylate and tetraethylene glycol dimethacrylate,

tetra(ethylene glycol) diacrylate and trimethylolpropane triacrylate,

trimethylolpropane triacrylate and neopentyl glycol ethoxylate diacrylate,

di(ethylene glycol) dimethacrylate and tetra(ethylene glycol) diacrylate,

di(ethylene glycol) dimethacrylate and tri(ethylene glycol) dimethacrylate,

di(ethylene glycol) dimethacrylate and neopentyl glycol dimethacrylate,

tetra(ethylene glycol) dimethacrylate and tri(ethylene glycol) dimethacrylate,

tetra(ethylene glycol) dimethacrylate and 1,4-butanediol dimethacrylate,

tetra(ethylene glycol) dimethacrylate and 1,6-hexanediol ethoxylate diacrylate,

1,6-hexanediol propoxylate diacrylate and poly(ethylene glycol) diacrylate,

1,6-hexanediol propoxylate diacrylate and trimethylolpropane benzoate diacrylate,

1,6-hexanediol propoxylate diacrylate and trimethylolpropane ethoxylate (1 EO/OH) methyl diacrylate,

1,6-hexanediol propoxylate diacrylate and 1,6-hexanediol ethoxylate diacrylate,

neopentyl glycol diacrylate and trimethylolpropane ethoxylate (1 EO/OH) methyl diacrylate, or

neopentyl glycol diacrylate and 1,6-hexanediol ethoxylate diacrylate.

10. The culture of claim 9, wherein the polymer material comprises a homopolymer formed from tetra(ethylene glycol) diacrylate or glycerol dimethacrylate or a copolymer formed from (i) di(ethylene glycol) dimethacrylate and neopentyl glycol dimethacrylate, (ii) glycerol dimethacrylate and tri(ethylene glycol) dimethacrylate, (iii) glycerol dimethacrylate and 1,4-butanediol dimethacrylate, (iv) tetra(ethylene glycol) diacrylate and trimethylolpropane triacrylate.

11. The culture of claim 9, wherein the polymer material consists essentially of a homopolymer formed from tetra(ethylene glycol) diacrylate or glycerol dimethacrylate or a copolymer formed from (i) di(ethylene glycol) dimethacrylate and neopentyl glycol dimethacrylate, (ii) glycerol dimethacrylate and tri(ethylene glycol) dimethacrylate, (iii) glycerol dimethacrylate and 1,4-butanediol dimethacrylate, (iv) tetra(ethylene glycol) diacrylate and trimethylolpropane triacrylate.

12. The culture of claim 9, wherein culture medium is a chemically defined medium.

13. The culture of claim 9, wherein the stem cell-derived cardiomyocyte is a human embryonic stem cell-derived cardiomyocyte.

14. A method for culturing a stem cell-derived cardiomyocyte, comprising:

depositing a suspension comprising the stem cell-derived cardiomyocyte on a polymer material; and

culturing the deposited stem cell-derived cardiomyocyte in a cell culture medium,

wherein the polymer material comprises

(i) a homopolymer formed from tetra(ethylene glycol) diacrylate, glycerol dimethacrylate, triethylene glycol dimethacrylate, 1,4-butanediol dimethacrylate, or poly(ethylene glycol) diacrylate, or

(ii) a copolymer formed from

tetra(ethylene glycol) diacrylate and 1,4-butanediol dimethacrylate,

glycerol dimethacrylate and tetra(ethylene glycol) diacrylate,

glycerol dimethacrylate and tri(ethylene glycol) dimethacrylate,

glycerol dimethacrylate and 1,4-butanediol dimethacrylate,

glycerol dimethacrylate and poly(ethylene glycol) diacrylate,

triethylene glycol dimethacrylate and 1,4-butanediol dimethacrylate,

poly(ethylene glycol) diacrylate and tetra(ethylene glycol) diacrylate,

di(ethylene glycol) dimethacrylate and tetraethylene glycol dimethacrylate,

tetra(ethylene glycol) diacrylate and trimethylolpropane triacrylate,

trimethylolpropane triacrylate and neopentyl glycol ethoxylate diacrylate,

di(ethylene glycol) dimethacrylate and tetra(ethylene glycol) diacrylate,

di(ethylene glycol) dimethacrylate and tri(ethylene glycol) dimethacrylate,

di(ethylene glycol) dimethacrylate and neopentyl glycol dimethacrylate,

tetra(ethylene glycol) dimethacrylate and tri(ethylene glycol) dimethacrylate,

tetra(ethylene glycol) dimethacrylate and 1,4-butanediol dimethacrylate,

tetra(ethylene glycol) dimethacrylate and 1,6-hexanediol ethoxylate diacrylate,

1,6-hexanediol propoxylate diacrylate and poly(ethylene glycol) diacrylate,

1,6-hexanediol propoxylate diacrylate and trimethylolpropane benzoate diacrylate,

1,6-hexanediol propoxylate diacrylate and trimethylolpropane ethoxylate (1 EO/OH) methyl diacrylate,

1,6-hexanediol propoxylate diacrylate and 1,6-hexanediol ethoxylate diacrylate,

neopentyl glycol diacrylate and trimethylolpropane ethoxylate (1 EO/OH) methyl diacrylate, or

neopentyl glycol diacrylate and 1,6-hexanediol ethoxylate diacrylate.

15. The method of claim 14, wherein culturing the deposited stem cell-derived cardiomyocyte in a cell culture medium comprises culturing the cardiomyocyte in a chemically defined medium.

16. The method of claim 14, wherein polymer material comprises a homopolymer formed from tetra(ethylene glycol) diacrylate.

17. The method of claim 14, wherein polymer material comprises a copolymer formed from di(ethylene glycol) dimethacrylate and neopentyl glycol dimethacrylate.

18. The method of claim 14, wherein the polymeric material comprises a homopolymer formed from glycerol dimethacrylate.

19. The method of claim 14, wherein the polymeric material comprises a copolymer formed from glycerol dimethacrylate and tri(ethylene glycol) dimethacrylate.

20. The method of claim 14, wherein the polymeric material comprises a copolymer formed from glycerol dimethacrylate and 1,4-butanediol dimethacrylate.

21. The method of claim 14, wherein the polymeric material comprises a copolymer formed from tetra(ethylene glycol) diacrylate and trimethylolpropane triacrylate.

22. The method of claim 14, wherein the stem cell-derived cardiomyocyte is a human embryonic stem cell-derived cardiomyocyte.

CLAIMS

What is claimed is:

1. A culture of a pluripotent stem cell-derived cardiomyocyte, comprising:

an article comprising a polymeric material disposed on a surface; the pluripotent stem cell-derived cardiomyocyte disposed on the polymer material; and

a culture medium in which the pluripotent stem cell-derived cardiomyocyte is cultured,

wherein the polymer material comprises

(i) tetra(ethylene glycol) diacrylate, glycerol dimethacrylate, triethylene glycol dimethacrylate, 1,4-butanediol dimethacrylate, or poly(ethylene glycol) diacrylate, or

(ii) a copolymer formed from tetra(ethylene glycol) diacrylate and 1,4-butanediol dimethacrylate, glycerol dimethacrylate and tetra(ethylene glycol) diacrylate, glycerol dimethacrylate and tri(ethylene glycol) dimethacrylate, glycerol dimethacrylate and 1,4-butanediol dimethacrylate, glycerol dimethacrylate and poly(ethylene glycol) diacrylate, triethylene glycol dimethacrylate and 1,4-butanediol dimethacrylate, poly (ethylene glycol) diacrylate and tetra(ethylene glycol) diacrylate, di(ethylene glycol) dimethacrylate and tetraethylene glycol dimethacrylate, tetra(ethylene glycol) diacrylate and trimethylolpropane triacrylate, trimethylolpropane triacrylate and neopentyl glycol ethoxylate diacrylate, or tetra(ethylene glycol) dimethacrylate and di(ethylene glycol) dimethacrylate.

2. The culture of claim **1**, wherein the polymer material comprises a homopolymer formed from tetra(ethylene glycol) diacrylate or glycerol dimethacrylate or a copolymer formed from (i) glycerol dimethacrylate and tri(ethylene glycol) dimethacrylate, (ii) glycerol dimethacrylate and 1,4-butanediol dimethacrylate, or (iii) tetra(ethylene glycol) diacrylate and trimethylolpropane triacrylate.

3. The culture of claim **1**, wherein the polymer material consists essentially of a homopolymer formed from tetra (ethylene glycol) diacrylate or glycerol dimethacrylate or a copolymer formed from (i) glycerol dimethacrylate and tri (ethylene glycol) dimethacrylate, (ii) glycerol dimethacrylate and 1,4-butanediol dimethacrylate, or (iii) tetra(ethylene glycol) diacrylate and trimethylolpropane triacrylate.

4. The culture of claim **1**, wherein culture medium is a chemically defined medium.

5. The culture of claim **1**, wherein the stem cell-derived cardiomyocyte is a human embryonic stem cell-derived cardiomyocyte.