CLAIMS

1. An implant comprising a surface that does not comprise alginate, in which the surface comprises a material modified with a moiety of structure -X-R_1,

in which:

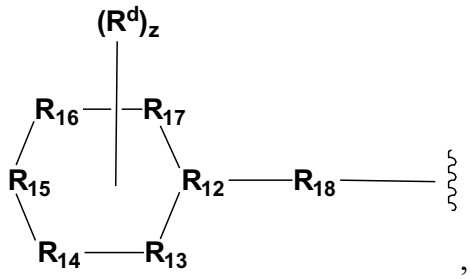
X is oxygen, sulfur, or NR_2, in which R_2 is hydrogen, alkyl, or substituted alkyl, and

R_1 has the structure

$$\mathbf{–A–B(–C)}_{\delta},$$

Formula XII

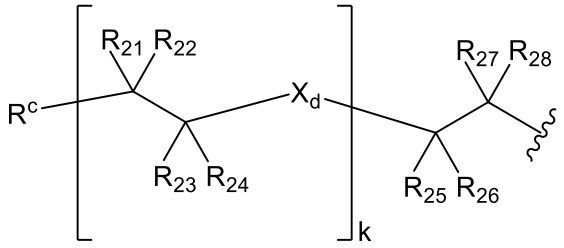
in which **A** is



,

Formula VI

in which R^{18} in **A** is -$(CR_{19}R_{19})_p$-, p is an integer from 0 to 5, each R_{19} is hydrogen, each R^d is independently alkyl, alkenyl, alkynyl, substituted alkyl, substituted alkenyl, substituted alkynyl, alkoxy, alkylamino, dialkylamino, hydroxy, aryl, substituted aryl, heteroaryl, substituted heteroaryl, substituted alkoxy, carboxyl, substituted carboxyl, amino, substituted amino, amido, substituted amido, cyclic, substituted cyclic, heterocyclic, or substituted heterocyclic, z is an integer from 0 to 11, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, and R_{17} in **A** are independently C or N, in which the bonds between adjacent R_{12} to R_{17} are double or single according to valency, and in which R_{12} to R_{17} are bound to none, one, or two hydrogens according to valency, or

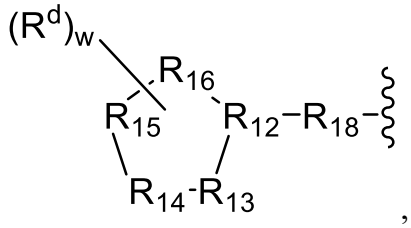


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Formula VIII

in which R_{21}, R_{22}, R_{23}, R_{24}, R_{25}, R_{26}, R_{27}, and R_{28} in **A** are independently hydrogen, alkyl, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, arylalkyl, substituted arylalkyl, alkoxy, substituted alkoxy, aroxy, substituted aroxy, carbonyl, substituted carbonyl, carboxyl, substituted carboxyl, amino, substituted amino, amido, substituted amido, cyclic, substituted cyclic, heterocyclic, substituted heterocyclic, poly(ethylene glycol), or poly(lactic-co-glycolic acid), k is an integer from 0 to 20, each X_d is independently absent, O, or S, and R^c is **B**,

in which **B** is

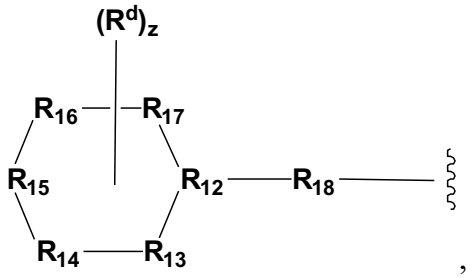


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Formula IX

in which R^{18} in **B** is $-(CR_{19}R_{19})_p-$, p is an integer from 0 to 5, each R_{19} is hydrogen, each R^d is independently alkyl, alkenyl, alkynyl, substituted alkyl, substituted alkenyl, substituted alkynyl, alkoxy, alkylamino, dialkylamino, hydroxy, aryl, substituted aryl, heteroaryl, substituted heteroaryl, substituted alkoxy, carboxyl, substituted carboxyl, amino, substituted amino, amido, substituted amido, cyclic, substituted cyclic, heterocyclic, or substituted heterocyclic, w is an integer from 0 to 4, R_{12}, R_{13}, R_{14}, R_{15}, and R_{16} in **B** are independently C or N, in which the bonds between adjacent R_{12} to R_{16} are double or single according to valency, and in which R_{12} to R_{16} are bound to none, one, or two hydrogens according to valency,

in which **C** is



,

alkyl, substituted carbonyl, substituted heteroaryl, or substituted alkyl,

in which R^{18} in **C** is $-(CR_{19}R_{19})_p-$ or $-(CR_{19}R_{19})_p-X_b-(CR_{19}R_{19})_q-$, in which p and q are independently integers from 0 to 5, X_b is absent, -O-, -S-, -S(O)-, $-S(O)_2-$, or NR_{20}, each R_{19} is hydrogen, R_{20} is alkyl or substituted alkyl, each R^d is independently alkyl, alkenyl, alkynyl, substituted alkyl, substituted alkenyl, substituted alkynyl, alkoxy, alkylamino, dialkylamino, hydroxy, aryl, substituted aryl, heteroaryl, substituted heteroaryl, substituted alkoxy, carboxyl, substituted carboxyl, amino, substituted amino, amido, substituted amido, cyclic, substituted cyclic, heterocyclic, or substituted heterocyclic, z is an integer from 0 to 11, in which R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, and R_{17} in **C** are independently C, O, N, S, S(O), or $S(O)_2$, in which the bonds between adjacent R_{12} to R_{17} are double or single according to valency, and in which R_{12} to R_{17} are bound to none, one, or two hydrogens according to valency, and

in which δ is 1.

2. An implant according to Claim 1, in which the material modified with the moiety of structure $-X-R_1$ is a polymeric material.

3. An implant according to Claim 2, in which the polymeric material comprises polystyrene, substituted polystyrene, polyethylene, polypropylene, polyacetylene, poly(vinyl chloride), polyolefin copolymer, poly(urethane), polyacrylate, polymethacrylate, polyacrylamide, polymethacrylamide, poly(methyl methacrylate), poly(2-hydroxyethyl methacrylate), polyester, polysiloxane, polydimethylsiloxane, polyether, poly(orthoester), poly(carbonate), poly(hydroxyalkanoate), polyfluorocarbon, polytetrafluoroethylene, natural latex, collagen, cellulosic polymer, alkyl cellulose, polycarbonate, polyamide, nylon, polyalkene, polysulfone, polyacrylonitrile, poly(glycolic acid), poly(L-lactic acid), poly(lactic glycolic acid), or polydioxanone.

4. An implant according to Claim 2 or 3, in which the polymeric material comprises polyether, polyester, polysulfone, polydimethylsiloxane, or polytetrafluoroethylene.

5. An implant according to any preceding claim which contains biological material.

6. An implant according to Claim 5, in which the biological material comprises a cell.

7. An implant according to Claim 6, in which the cell is a genetically engineered cell.

8. An implant according to Claim 6 or 7, in which the cell is a hormone-producing cell.

9. An implant according to Claim 8, in which the hormone-producing cell comprises an insulin-producing cell.

10. An implant according to Claim 9, in which the insulin-producing cell comprises an islet beta cell.

11. An implant according to Claim 6, 7 or 8, in which the cell is derived from a retinal epithelial cell line.

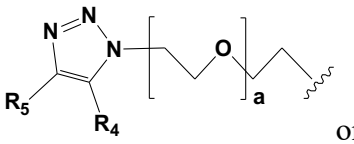
12. An implant according to any of Claims 6 to 11, in which the cell produces a therapeutic agent.

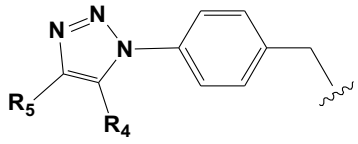
13. An implant according to any of Claims 6 to 12, in which the cell in the implant is viable for at least 14 days after implantation.

14. An implant according to any preceding claim, in which the implant further comprises a pore size of between about 0.1 μm and 2 μm or between about 0.1 μm and 1 μm.

15. An implant according to any preceding claim, in which:

R_1 is, independently in one or more sites of modification on the material,

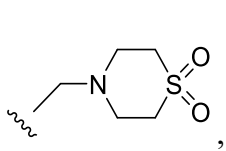


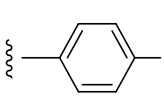
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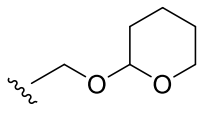
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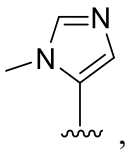
R_4, and R_5, are, independently, hydrogen, methyl, -CH_2-OH, or **C**,

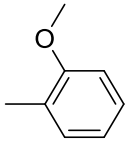
in which, **C** is -C(O)CH_3, -CH_2-N(CH_2-CH_3)$_2$,



,


,


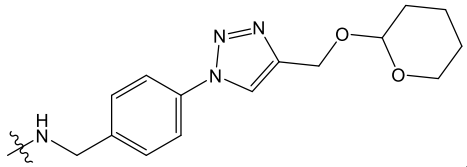
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, or


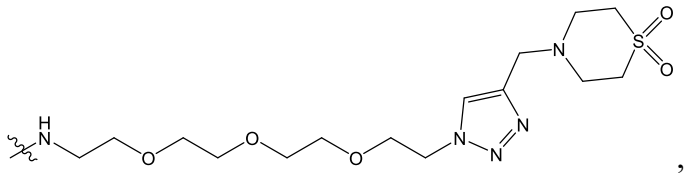
, and

a is an integer between 1 and 20, inclusive.

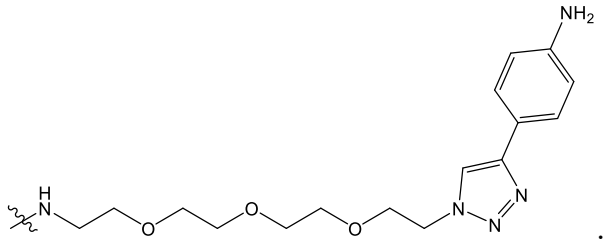
16. An implant according to any preceding claim, in which the moiety of structure –X-R_1 comprises:



,

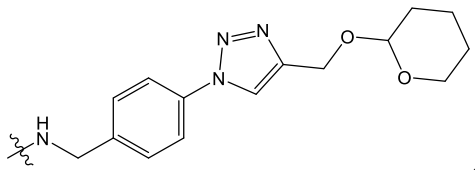


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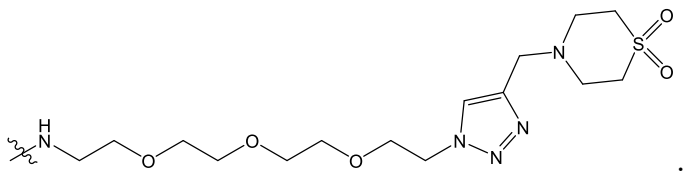
.

17. An implant according to any preceding claim, in which the moiety of structure –X-R_1 comprises:



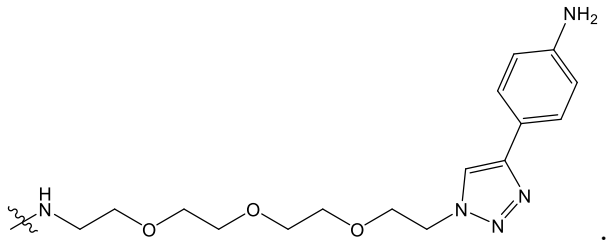
.

18. An implant according to any of Claims 1 to 16, in which the moiety of structure –X-R_1 comprises:



.

19. An implant according to any of Claims 1 to 16, in which the moiety of structure –X-R_1 comprises:



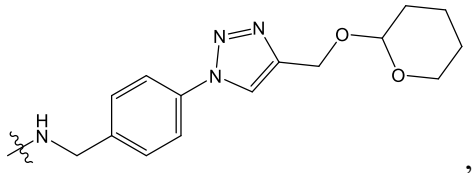
.

20. An implant according to any preceding claim, in which the surface is an exterior surface.

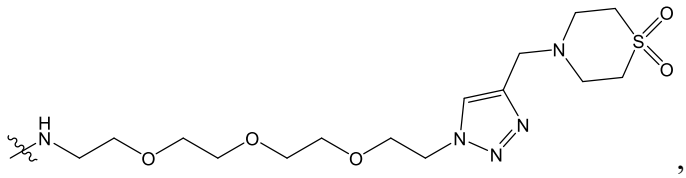
21. An implant according to any of Claims 1 to 19, in which the surface is an interior surface.

22. An implant according to any preceding claim, in which the moiety of structure –X-R_1 is covalently attached to the surface.

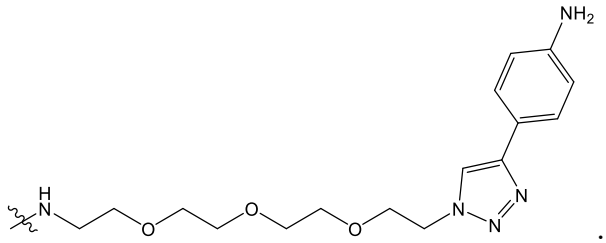
23. An implant according to Claim 20, 21 or 22, in which the moiety of structure –X-R_1 comprises:



,

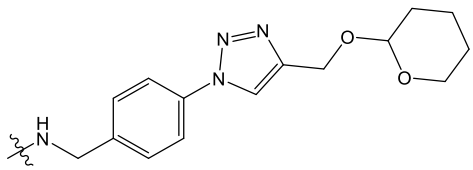


, or



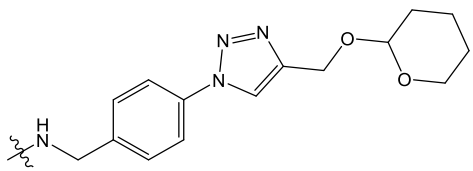
.

24. An implant according to Claim 20, in which the surface is an exterior surface and the moiety of structure –X-R_1 comprises



.

25. An implant according to Claim 21, in which the surface is an interior surface and the moiety of structure –X-R_1 comprises



.

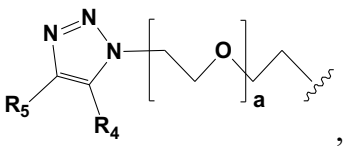
26. An implant comprising a cell that produces a therapeutic agent, in which the implant comprises a surface that does not comprise alginate and the surface comprises a material modified with a moiety of structure –X-R_1,

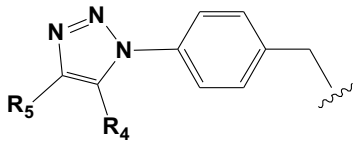
in which:

X is oxygen, sulfur, or NR_2,

R_2 is hydrogen, alkyl, or substituted alkyl,

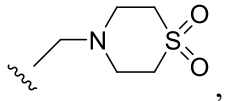
R_1 has the structure

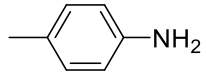


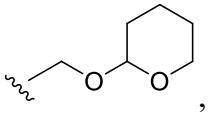
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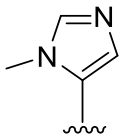
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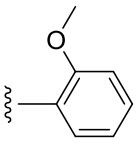
in which

R_4 and R_5 are, independently, hydrogen, methyl, -CH_2-OH, -C(O)CH_3, -CH_2-N(CH_2-CH_3)$_2$,


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,


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, or


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and

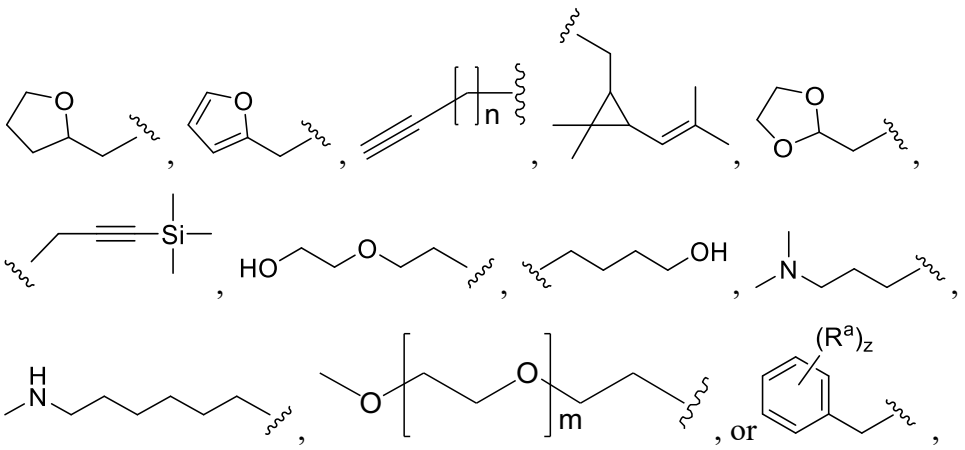
a is an integer from 1 to 30.

27. An implant comprising a surface that does not comprise alginate, in which the surface comprises a material modified with a moiety of structure -X-R_1,

in which

X is oxygen, sulfur, or NR_2, in which R_2 is hydrogen, alkyl, or substituted alkyl, and

R_1 is, independently in one or more sites of chemical modification,



in which R^a is alkylamino, dialkylamino, hydroxy, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, alkoxy, substituted alkoxy, aroxy, substituted aroxy, alkylthio, substituted alkylthio, arylthio, substituted arylthio, carbonyl, substituted carbonyl, carboxyl, substituted carboxyl, amino, substituted amino, amido, substituted amido, polyaryl, substituted polyaryl, cyclic, substituted cyclic, heterocyclic, substituted heterocyclic, amino acid, poly(ethylene glycol), peptide, polypeptide group, arylalkyl, substituted arylalkyl, sulfonyl, substituted sulfonyl, sulfonic acid, phosphoryl, substituted phosphoryl, phosphonyl, and substituted phosphonyl, or poly(lactic-co-glycolic acid),

in which, n is an integer between 1 and 12, inclusive,

m is an integer between 3 and 16, inclusive, and

z is an integer between 1 and 5, inclusive.

28. An implant according to Claim 26 or 27, in which the material modified with the moiety of structure -X-R_1 is a polymeric material.

29. An implant according to Claim 28, in which the polymeric material comprises polystyrene, substituted polystyrene, polyethylene, polypropylene, polyacetylene, poly(vinyl chloride), polyolefin copolymer, poly(urethane), polyacrylate, polymethacrylate, polyacrylamide, polymethacrylamide, poly(methyl methacrylate), poly(2-hydroxyethyl methacrylate), polyester, polysiloxane, polydimethylsiloxane, polyether, poly(orthoester), poly(carbonate), poly(hydroxyalkanoate), polyfluorocarbon, polytetrafluoroethylene, natural latex, collagen, cellulosic polymer, alkyl cellulose, polycarbonate, polyamide, nylon, polyalkene, polysulfone, polyacrylonitrile, poly(glycolic acid), poly(L-lactic acid), poly(lactic glycolic acid), or polydioxanone.

30. An implant according to Claim 28 or 29, in which the polymeric material comprises polyether, polyester, polysulfone, polydimethylsiloxane, or polytetrafluoroethylene.

31. An implant according to any of Claims 27 to 30, in which the implant contains biological material.

32. An implant according to Claim 31, in which the biological material comprises a cell.

33. An implant according to Claim 26 or 32, in which the cell is a genetically engineered cell.

34. An implant according to Claim 26, 32 or 33, in which the cell is a hormone-producing cell.

35. An implant according to Claim 34, in which the hormone-producing cell comprises an insulin-producing cell.

36. An implant according to Claim 35, in which the insulin-producing cell comprises an islet beta cell.

37. An implant according to any of Claims 26 or 32 to 34, in which the cell is derived from a retinal epithelial cell line.

38. An implant according to any of Claims 32 to 37, in which the cell produces a therapeutic agent.

39. An implant according to any preceding claim, in which the implant comprises a cardiac pacemaker, a catheter, a needle injection catheter, a blood clot filter, a vascular transplant, a balloon, a stent transplant, a biliary stent, an intestinal stent, a bronchial stent, an esophageal stent, a ureteral stent, an aneurysm-filling coil or other coil device, a surgical repair mesh, a transmyocardial revascularization device, a percutaneous myocardial revascularization device, a fiber, a hollow fiber, a membrane, a textile, a blood container, a titer plate, an adsorber media, a dialyzer, a connecting piece, a sensor, a valve, an endoscope, a filter, a pump chamber, or another medical device intended to have hemocompatible properties.

40. An implant according to any preceding claim, in which the density of the moiety on the surface of the implant is at least 0.1 chemical derivatizations per μm^2.

41. An implant according to any preceding claim, in which the concentration of surface modifications by the moiety is between 0.1 and 50 percent of the total modification sites.

42. An implant according any of Claims 12, 26 or 38, in which the therapeutic agent is a protein.

43. An implant according to Claim 42, in which the protein is selected from insulin, phenylalanine hydroxylase, biopterin cofactor, fumarylacetoacetate hydrolase, tyrosine aminotransferase, protein(s) involved in tyrosine breakdown, cystathionine-β-synthase, methylenetetrahydrofolate reductase, protein(s) involved in formation of the methylcobalamin form of vitamin $B_{12,}$ branched-chain ketoacid dehydrogenase complex, propionyl-CoA carboxylase, pyruvate carboxylase, 3-methylcrotonyl-CoA carboxylase, methylmalonyl-CoA mutase, protein(s) involved in vitamin B_{12} metabolism, protein(s) involved in regulation or utilization of lipoproteins, very long chain acyl-CoA dehydrogenase, long chain hydroxyacyl-CoA dehydrogenase, dehydrogenase, medium chain acyl-CoA dehydrogenase, short chain acyl CoA dehydrogenase, short chain hydroxyacyl-CoA dehydrogenase, protein(s) involved in glycogenolysis, galactose-1-phosphate uridyl transferase, enzyme(s) that build the carbohydrate side-chains on proteins, protein(s) involved in balance between purine synthesis and disposal, hypoxanthine phosphoribosyl-transferase, cerebrosidase, beta-hexosaminidase A, α-galactosidase, α-iduronidase, iduronate sulfatase, enzyme(s) involved in heparan sulfate degradation, arylsulfatase B, galactose 6-sulfatase, β-galactosidase, carbamyl phosphate synthetase, ornithine transcarbamylase, protein(s) involved in branched-chain fatty acid production and/or breakdown, alanine-glyoxylate transaminase, cellular metabolic enzymes, and muscle cell metabolic enzymes.

44. An implant according to any of Claims 12, 26, 38, or 42, in which the therapeutic agent is provided in a sufficient amount to treat a disease or disorder selected from diabetes, lysosomal storage disorders, neurodegenerative disorders, chronic inflammatory autoimmune diseases, cancer, liver diseases, impaired fracture, delayed union fraction, osteonecrosis, osteoporosis, disorders of amino acid metabolism, disorders of organic acid metabolism, disorders of fatty acid metabolism, disorders of purine metabolism, disorders of pyrimidine metabolism, disorders of urea formation, and disorders of peroxisomal metabolism.

45. An implant according to Claim 44, in which the disease or disorder is selected from diabetes or a lysosomal storage disorder.

46. An implant according to any of Claims 6 to 8 and 32 to 34, in which the cell is derived from a cell type selected from liver cells, hepatoblasts, liver stellate cells, biliary cells, hepatocytes, pancreatic islet cells, isolated pancreatic beta cells, insulinoma cells, kidney cells, epidermal cells, epithelial cells, neural cells, neuron cells, glial cells, astrocytes, ganglion cells, retinal epithelial cells, adrenal medulla cells, lung cells, cardiac muscle cells, osteoblast cells, osteoclast cells, bone marrow cells, spleen cells, thymus cells, glandular cells, blood cells, T cells, B cells, macrophage lineage cells, lymphocytes, monocytes, endocrine hormone-producing cells, parathyroid, thyroid, or adrenal cells, cells of intestinal origin and other cells acting primarily to synthesize and secret or to metabolize materials, endothelial cells, capillary endothelial cells, fibroblasts, dermal fibroblasts, myogenic cells, keratinocytes, smooth muscle cells, progenitor cells, bone marrow progenitor cells, adipose progenitor cells, hepatic precursor cells, endothelia progenitor cells, peripheral blood progenitor cells, progenitor cells from muscle, progenitor cells from skin, and marrow stromal cells.

47. An implant according to Claim 42 or 46, in which the cell is genetically engineered to produce a therapeutic protein selected from blood clotting factors, factor VIII, factor IX, tissue factor, von Willebrand factor, cytokines, interleukins, cytokine receptors, hormones, anti-diuretic hormone (ADH), human growth hormone (hGH), prolactin, growth hormone-releasing hormone (GHRH), thyroid stimulating hormone (TSH), thyrotropin-releasing hormone (TRH), adrenocorticotropic hormone (ACTH), follicle-stimulating hormone (FSH), luteinizing hormone (LH), luteinizing hormone-releasing hormone (LHRH), thyroxine, calcitonin, parathyroid hormone, aldosterone, cortisol, epinephrine, glucagon, insulin, estrogen, progesterone, testosterone, growth factors, vascular endothelial growth factor (VEGF), nerve growth factor (NGF), platelet-derived growth factor (PDGF), fibroblast growth factor (FGF), epidermal growth factor (EGF), transforming growth factor (TGF), insulin-like growth factor-I (IGF-I) and insulin-like growth factor-II (IGF-II).

48. An implant for use in providing a therapeutic agent to a subject, in which the implant comprises:

(i) a cell that produces the therapeutic agent, and

(ii) a surface that does not comprise alginate, in which the surface comprises a material modified with a moiety of structure $–X-R_1$, and in which:

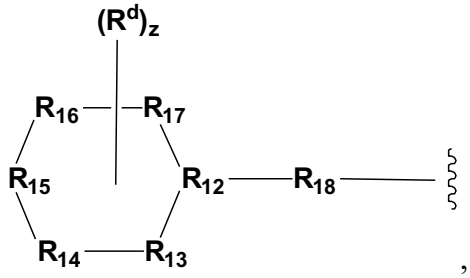
X is oxygen, sulfur, or NR_2, in which R_2 is hydrogen, alkyl, or substituted alkyl, and

R_1 has the structure

$$–A–B(–C)_\delta,$$

Formula XII

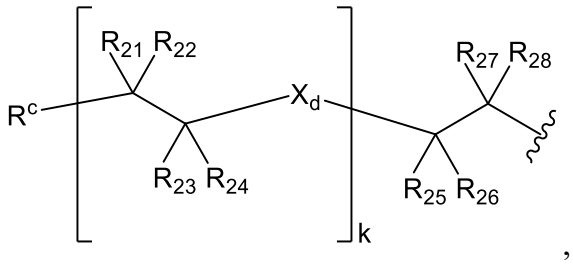
in which **A** is



,

Formula VI

in which R^{18} in **A** is $-(CR_{19}R_{19})_p-$, p is an integer from 0 to 5, each R_{19} is hydrogen, each R^d is independently alkyl, alkenyl, alkynyl, substituted alkyl, substituted alkenyl, substituted alkynyl, alkoxy, alkylamino, dialkylamino, hydroxy, aryl, substituted aryl, heteroaryl, substituted heteroaryl, substituted alkoxy, carboxyl, substituted carboxyl, amino, substituted amino, amido, substituted amido, cyclic, substituted cyclic, heterocyclic, or substituted heterocyclic, z is an integer from 0 to 11, R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, and R_{17} in **A** are independently C or N, in which the bonds between adjacent R_{12} to R_{17} are double or single according to valency, and in which R_{12} to R_{17} are bound to none, one, or two hydrogens according to valency, or



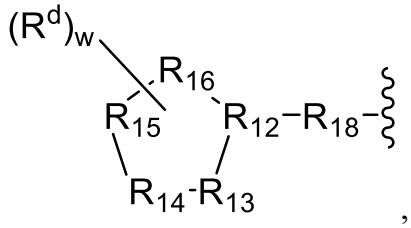
,

Formula VIII

in which R_{21}, R_{22}, R_{23}, R_{24}, R_{25}, R_{26}, R_{27}, and R_{28} in **A** are independently hydrogen, alkyl, substituted alkyl, alkenyl, substituted alkenyl, alkynyl, substituted alkynyl, aryl, substituted aryl, heteroaryl, substituted heteroaryl, arylalkyl, substituted arylalkyl, alkoxy, substituted alkoxy, aroxy, substituted aroxy, carbonyl, substituted carbonyl,

carboxyl, substituted carboxyl, amino, substituted amino, amido, substituted amido, cyclic, substituted cyclic, heterocyclic, substituted heterocyclic, poly(ethylene glycol), or poly(lactic-co-glycolic acid), k is an integer from 0 to 20, each X_d is independently absent, O, or S, and R^c is **B**,

in which **B** is

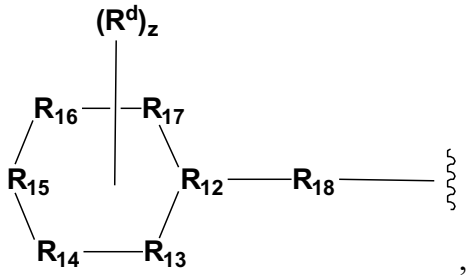


,

Formula IX

in which R^{18} in **B** is $-(CR_{19}R_{19})_p-$, p is an integer from 0 to 5, each R_{19} is hydrogen, each R^d is independently alkyl, alkenyl, alkynyl, substituted alkyl, substituted alkenyl, substituted alkynyl, alkoxy, alkylamino, dialkylamino, hydroxy, aryl, substituted aryl, heteroaryl, substituted heteroaryl, substituted alkoxy, carboxyl, substituted carboxyl, amino, substituted amino, amido, substituted amido, cyclic, substituted cyclic, heterocyclic, or substituted heterocyclic, w is an integer from 0 to 4, R_{12}, R_{13}, R_{14}, R_{15}, and R_{16} in **B** are independently C or N, in which the bonds between adjacent R_{12} to R_{16} are double or single according to valency, and in which R_{12} to R_{16} are bound to none, one, or two hydrogens according to valency,

in which **C** is



,

Formula VI

alkyl, substituted carbonyl, substituted heteroaryl, or substituted alkyl,

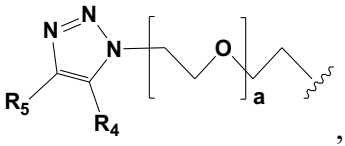
in which R^{18} in **C** is $-(CR_{19}R_{19})_p-$ or $-(CR_{19}R_{19})_p-X_b-(CR_{19}R_{19})_q-$, in which p and q are independently integers from 0 to 5, X_b is absent, -O-, -S-, -S(O)-, $-S(O)_2-$, or NR_{20}, each

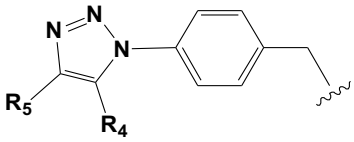
R_{19} is hydrogen, R_{20} is alkyl or substituted alkyl, each R^d is independently alkyl, alkenyl, alkynyl, substituted alkyl, substituted alkenyl, substituted alkynyl, alkoxy, alkylamino, dialkylamino, hydroxy, aryl, substituted aryl, heteroaryl, substituted heteroaryl, substituted alkoxy, carboxyl, substituted carboxyl, amino, substituted amino, amido, substituted amido, cyclic, substituted cyclic, heterocyclic, or substituted heterocyclic, z is an integer from 0 to 11, in which R_{12}, R_{13}, R_{14}, R_{15}, R_{16}, and R_{17} in **C** are independently C, O, N, S, S(O), or $S(O)_2$, in which the bonds between adjacent R_{12} to R_{17} are double or single according to valency, and in which R_{12} to R_{17} are bound to none, one, or two hydrogens according to valency, and

in which δ is 1.

49. An implant for use according to Claim 48, in which:

R_1 is, independently in one or more sites of modification on the material,

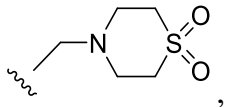


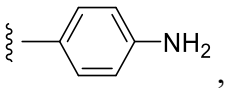
, or


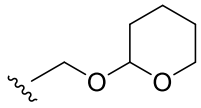
,

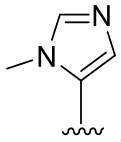
R_4, and R_5, are, independently, hydrogen, methyl, or $-CH_2-OH$ or **C**,

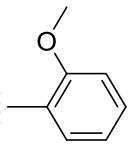
in which, **C** is methyl, $-C(O)CH_3$, $-CH_2-N(CH_2-CH_3)_2$,



,


,


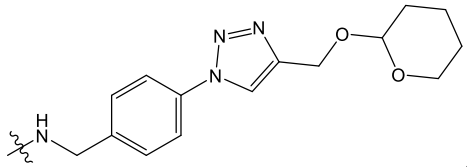
,


, or


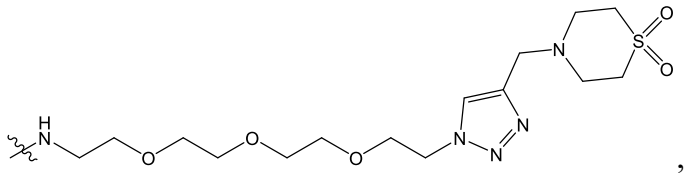
, and

a is an integer between 1 and 20, inclusive.

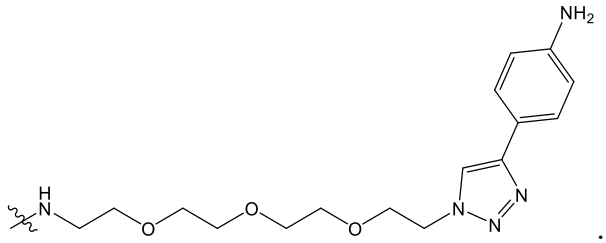
50. An implant for use according to Claim 48 or 49, in which the moiety of structure $–X-R_1$ comprises:



,



, or



.

51. An implant for use according to Claim 48, 49 or 50, in which the material modified with the moiety of -X-R_1 comprises a polymeric material.

52. An implant for use according to Claim 51, in which the polymeric material comprises polystyrene, substituted polystyrene, polyethylene, polypropylene, polyacetylene, poly(vinyl chloride), polyolefin copolymer, poly(urethane), polyacrylate, polymethacrylate, polyacrylamide, polymethacrylamide, poly(methyl methacrylate), poly(2-hydroxyethyl methacrylate), polyester, polysiloxane, polydimethylsiloxane, polyether, poly(orthoester), poly(carbonate), poly(hydroxyalkanoate), polyfluorocarbon, polytetrafluoroethylene, natural latex, collagen, cellulosic polymer, alkyl cellulose, polycarbonate, polyamide, nylon, polyalkene, polysulfone, polyacrylonitrile, poly(glycolic acid), poly(L-lactic acid), poly(lactic glycolic acid), or polydioxanone.

53. An implant for use according to Claim 51 or 52, in which the polymeric material comprises polyether, polyester, polysulfone, polydimethylsiloxane, or polytetrafluoroethylene.

54. An implant for use according to any of Claims 48 to 53, in which the cell is a genetically engineered cell.

55. An implant for use according to any of Claims 48 to 54, in which the cell is a hormone-producing cell.

56. An implant for use according to Claim 55, in which the hormone-producing cell comprises an insulin-producing cell.

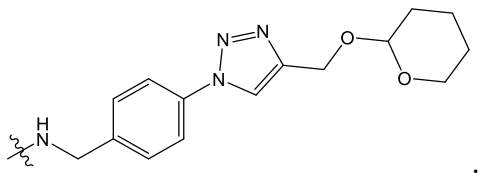
57. An implant for use according to Claim 56, in which the insulin-producing cell comprises an islet beta cell.

58. An implant for use according to any of Claims 48 to 55, in which the cell is derived from a retinal epithelial cell.

59. An implant for use according to any of Claims 48 to 58, in which the cell in the implant is viable for at least 14 days after implantation of the implant.

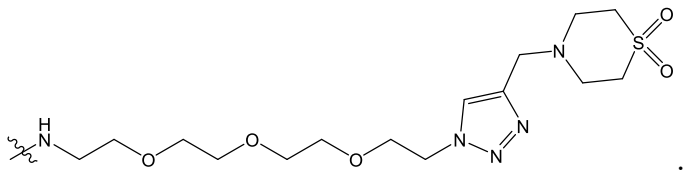
60. An implant for use according to any of Claims 48 to 59, in which the implant further comprises a pore size of between about 0.1 μm and 2 μm or between about 0.1 and 1 μm.

61. An implant for use according to any of Claims 48 to 60, in which the moiety of structure –X-R_1 comprises:



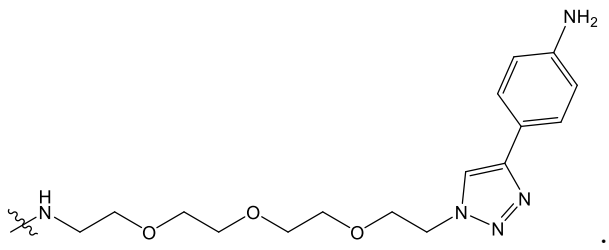
.

62. An implant for use according to any of Claims 48 to 60, in which the moiety of structure –X-R_1 comprises:



.

63. An implant for use according to any of Claims 48 to 60, in which the moiety of structure –X-R_1 comprises:



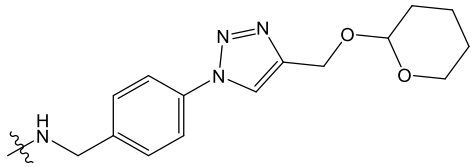
.

64. An implant for use according to any of Claims 48 to 63, in which the surface is an exterior surface.

65. An implant for use according to any of Claims 48 to 63, in which the surface is an interior surface.

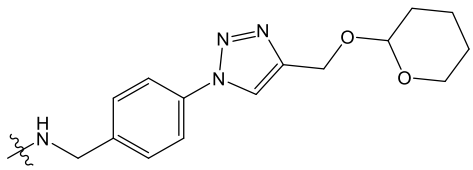
66. An implant for use according to any of Claims 48 to 65, in which the moiety of structure –X-R_1 is covalently attached to the surface.

67. An implant for use according to Claim 64, in which the surface is an exterior surface and the moiety of structure –X-R_1 comprises



.

68. An implant for use according to Claim 65, in which the surface is an interior surface and the moiety of structure –X-R_1 comprises



.

69. An implant for use according to any of Claims 48 to 68, in which the implant comprises a cardiac pacemaker, a catheter, a needle injection catheter, a blood clot filter, a vascular transplant, a balloon, a stent transplant, a biliary stent, an intestinal stent, a bronchial stent, an esophageal stent, a ureteral stent, an aneurysm-filling coil or other coil device, a surgical repair mesh, a transmyocardial revascularization device, a percutaneous myocardial revascularization device, a fiber, a hollow fiber, a membrane, a textile, a blood container, a titer plate, an adsorber media, a dialyzer, a connecting piece, a sensor, a valve, an endoscope, a filter, a pump chamber, or another medical device intended to have hemocompatible properties.

70. An implant for use according to any of Claims 48 to 69, in which the density of the moiety on the surface of the implant is at least 0.1 chemical derivatizations per μm^2.

71. An implant for use according to any of Claims 48 to 69, in which the concentration of surface modifications by the moiety is between 0.1 and 50 percent of the total modification sites.

72. An implant for use according to any of Claims 48 to 71, in which the therapeutic agent is a protein.

73. An implant for use according to Claim 72, in which the protein is selected from insulin, phenylalanine hydroxylase, biopterin cofactor, fumarylacetoacetate hydrolase, tyrosine aminotransferase, protein(s) involved in tyrosine breakdown, cystathionine-β-synthase, methylenetetrahydrofolate reductase, protein(s) involved in formation of the methylcobalamin form of vitamin $B_{12,}$ branched-chain ketoacid dehydrogenase complex, propionyl-CoA carboxylase, pyruvate carboxylase, 3-methylcrotonyl-CoA carboxylase, methylmalonyl-CoA mutase, protein(s) involved in vitamin B_{12} metabolism, protein(s) involved in regulation or utilization of lipoproteins, very long chain acyl-CoA dehydrogenase, long chain hydroxyacyl-CoA dehydrogenase, dehydrogenase, medium chain acyl-CoA dehydrogenase, short chain acyl CoA dehydrogenase, short chain hydroxyacyl-CoA dehydrogenase, protein(s) involved in glycogenolysis, galactose-1-phosphate uridyl transferase, enzyme(s) that build the carbohydrate side-chains on proteins, protein(s) involved in balance between purine synthesis and disposal, hypoxanthine phosphoribosyl-transferase, cerebrosidase, beta-hexosaminidase A, α-galactosidase, α-iduronidase, iduronate sulfatase, enzyme(s) involved in heparan sulfate degradation, arylsulfatase B, galactose 6-sulfatase, β-galactosidase, carbamyl phosphate synthetase, ornithine transcarbamylase, protein(s) involved in branched-chain fatty acid production and/or breakdown, alanine-glyoxylate transaminase, cellular metabolic enzymes, and muscle cell metabolic enzymes.

74. An implant for use according to any of Claims 48 to 73, in which the therapeutic agent is provided in a sufficient amount to treat a disease or disorder selected from diabetes, lysosomal storage disorders, neurodegenerative disorders, chronic inflammatory autoimmune diseases, cancer, liver diseases, impaired fracture, delayed union fraction, osteonecrosis, osteoporosis, disorders of amino acid metabolism, disorders of organic acid metabolism, disorders of fatty acid metabolism, disorders of purine metabolism, disorders of pyrimidine metabolism, disorders of urea formation, and disorders of peroxisomal metabolism.

75. An implant for use according to Claim 74, in which the disease or disorder is selected from diabetes or a lysosomal storage disorder.

76. An implant for use according to any of Claims 48 to 54 or 58, in which the therapeutic agent is a blood clotting factor and the disease or disorder is hemophilia.

77. An implant for use according to any of Claims 48 to 55, in which the cell is derived from a cell type selected from liver cells, hepatoblasts, liver stellate cells, biliary cells, hepatocytes, pancreatic islet cells, isolated pancreatic beta cells, insulinoma cells, kidney cells, epidermal cells, epithelial cells, neural cells, neuron cells, glial cells, astrocytes, ganglion cells, retinal epithelial cells, adrenal medulla cells, lung cells, cardiac muscle cells, osteoblast cells, osteoclast cells, bone marrow cells, spleen cells, thymus cells, glandular cells, blood cells, T cells, B cells, macrophage lineage cells, lymphocytes, monocytes, endocrine hormone-producing cells, parathyroid, thyroid, or adrenal cells, cells of intestinal origin and other cells acting primarily to synthesize and secret or to metabolize materials, endothelial cells, capillary endothelial cells, fibroblasts, dermal fibroblasts, myogenic cells, keratinocytes, smooth muscle cells, progenitor cells, bone marrow progenitor cells, adipose progenitor cells, hepatic precursor cells, endothelia progenitor cells, peripheral blood progenitor cells, progenitor cells from muscle, progenitor cells from skin, and marrow stromal cells.

78. An implant for use according to Claim 54 or 55, in which the cell is genetically engineered to produce a therapeutic protein selected from blood clotting factors (optionally factor VIII, factor IX, tissue factor, or von Willebrand factor), cytokines (optionally interleukins), cytokine receptors, hormones (optionally anti-diuretic hormone (ADH), human growth hormone (hGH), prolactin, growth hormone-releasing hormone (GHRH), thyroid stimulating hormone (TSH), thyrotropin-releasing hormone (TRH), adrenocorticotropic hormone (ACTH), follicle-stimulating hormone (FSH), luteinizing hormone (LH), luteinizing hormone-releasing hormone (LHRH), thyroxine, calcitonin, parathyroid hormone, aldosterone, cortisol, epinephrine, glucagon, insulin, estrogen, progesterone, or testosterone) and growth factors (optionally vascular endothelial growth factor (VEGF), nerve growth factor (NGF), platelet-derived growth factor (PDGF), fibroblast growth factor (FGF), epidermal growth factor (EGF), transforming growth factor (TGF), insulin-like growth factor-I (IGF-I) or insulin-like growth factor-II (IGF-II).