What is claimed is:

1. An amphiphilic branched prepolymer, comprising:
from about 5% to about 75%, preferably from about 10% to about 65%, more preferably from about 15% to about 55%, even more preferably from about 20% to about 45%, by weight of hydrophilic monomeric units derived from at least one hydrophilic vinylic monomer;
from about 1% to about 85%, preferably from about 2.5% to about 75%, more preferably from about 5% to about 65%, by weight of polysiloxane crosslinking units derived from at least one polysiloxane crosslinker having two or more terminal ethylenically-unsaturated groups;
from about 2% to about 48%, preferably from about 3% to about 38%, more preferably from from about 4% to about 28%, by weight of dangling polysiloxane chains each of which is terminated with an ethylenically unsaturated group, and
from about 0.25% to about 5%, preferably from about 0.5% to about 4%, more preferably from about 0.75% to about 3%, even more preferably from about 1% to about 2%, by weight of chain-transfer units derived from a chain transfer agent other than a RAFT agent.

2. The amphiphilic branched prepolymer of claim 1, wherein the amphiphilic branched polysiloxane prepolymer is obtained by:
(i) polymerizing a polymerizable composition to obtain an amphiphilic branched polysiloxane copolymer, wherein the polymerizable composition comprises
(a) a partially ethylenically-functionalized polysiloxane, wherein the partially ethylenically-functionalized polysiloxane is a mixture of reaction products obtained by reacting a first ethyleincally functionalizing vinylic monomer having a first reactive functional group with a functional polysiloxane compound having two or more second reactive functional groups at a molar equivalent ratio, $R_{Equivalent}$, of from about 40% to about 95%, preferably from about 50% to about 95%, more preferably from about 60% to about 92%, even more preferably from about 70% to about 90%, wherein each first reactive functional group reacts with one second reactive functional group in the presence or absence of a coupling agent to form a covalent bond or linkage, wherein the mixture of reaction product comprises at least one polysiloxane crosslinkers having at least two ethylenically unsaturated groups and at least one polysiloxane vinylic monomer or macromer having at least one second reactive functional group and at least one ethylenically unsaturated group,
(b) at least one hydrophilic vinylic monomer,
(c) optionally, but preferably, a hydrophobic vinylic monomer, more preferably, a

bulky hydrophobic vinylic monomer,

(d) a chain transfer agent other than a RAFT agent, wherein the chain transfer agent optionally but preferably including a third reactive functional group, and

(e) a free-radical initiator; and

(ii) ethylenically functionalizing the amphiphilic branched polysiloxane copolymer by reacting it with a second ethylenically functionalizing vinylic monomer having a fourth reactive functional group which reacts with one second or third reactive functional group in the presence or absence of a coupling agent to form a covalent linkage, thereby forming the amphiphilic branched polysiloxane prepolymer.

3. The amphiphilic branched prepolymer of claim 2, wherein the polymerizable composition comprising:

(a) from about 10% to about 94%, preferably from about 20% to about 80%, more preferably from about 40% to about 65%, by weight of the partially ethylenically-functionalized polysiloxane;

(b) from about 5% to about 75%, preferably from about 10% to about 65%, more preferably from about 15% to about 55%, even more preferably from about 20% to about 45%, by weight of at least one hydrophilic vinylic monomer;

(c) from 0 to about 55%, preferably from about 5% to about 45%, more preferably from about 10% to about 40%, even more preferably from about 15% to about 30%, by weight of a bulky hydrophobic vinylic monomer;

(d) from about 0.25% to about 5%, preferably from about 0.5% to about 4%, more preferably from about 0.75% to about 3%, even more preferably from about 1% to about 2%, by weight of a chain transfer agent other than a RAFT agent, wherein the chain transfer agent optionally but preferably including a reactive functional group;

(e) from 0 to 5% by weight, preferably from about 0.2% to 4% by weight, more preferably from about 0.3% to about 2.5% by weight, even more preferably from about 0.5% to about 1.8%, by weight of a polymerizable UV-abosorbing compound, and

(f) from about 0.1% to about 5%, preferably from about 0.2% to about 4%, more preferably from about 0.3% to about 3%, even more preferably from about 0.4% to about 1.5%, by weight of a free radical initiator,

wherein the percentages by weight of the above-listed components are relative to the combined weight of all polymerizable components.

4. The amphiphilic branched prepolymer of claim 2 or 3, wherein the hydrophilic vinylic monomer is free of reactive functional group capable of participating in a coupling reaction with the second ethylenically functionalizing vinylic monomer.

5. The amphiphilic branched prepolymer of claim 2 or 3, wherein the polymerizable composition comprises a first hydrophilic vinylic monomer free of any reactive functional group capable of participating in a coupling reaction with the second ethylenically functionalizing vinylic monomer and a second hydrophilic vinylic monomer having a reactive functional group capable of participating the coupling reaction with the second ethylenically functionalizing vinylic monomer, wherein the first and second hydrophilic vinylic monomers are present in the polymerizable composition at a ratio of from about 5:1 to about 30:1.

6. The amphiphilic branched prepolymer of claim 5, wherein the first hydrophilic vinylic monomer is selected from the group consisting of N,N-dimethyl (meth)acrylamide, N-methyl-3-methylene-2-pyrrolidone, 1-ethyl-3-methylene-2-pyrrolidone, 1-methyl-5-methylene-2-pyrrolidone, 1-ethyl-5-methylene-2-pyrrolidone, 5-methyl-3-methylene-2-pyrrolidone, 5-ethyl-3-methylene-2-pyrrolidone, 1-n-propyl-3-methylene-2-pyrrolidone, 1-n-propyl-5-methylene-2-pyrrolidone, 1-isopropyl-3-methylene-2-pyrrolidone, 1-isopropyl-5-methylene-2-pyrrolidone, 1-n-butyl-3-methylene-2-pyrrolidone, 1-tert-butyl-3-methylene-2-pyrrolidone, dimethylaminoethyl (meth)acrylate, N-vinyl-2-pyrrolidone, a C_1-C_4-alkoxy polyethylene glycol (meth)acrylate, N-vinyl formamide, N-vinyl acetamide, N-vinyl isopropylamide, N-vinyl-N-methyl acetamide, and mixtures thereof; and wherein the second hydrophilic vinylic monomer is selected from the group consisting of hydroxyl-substituted C_1-C_4 alkyl (meth)acrylate, hydroxyl-substituted C_1-C_4 alkyl (meth)acrylamide, amino-substituted C_1-C_4 alkyl (meth)acrylate, amino-substituted C_1-C_4 alkyl (meth)acrylamide, allyl alcohol, allyl amine, and mixture thereof.

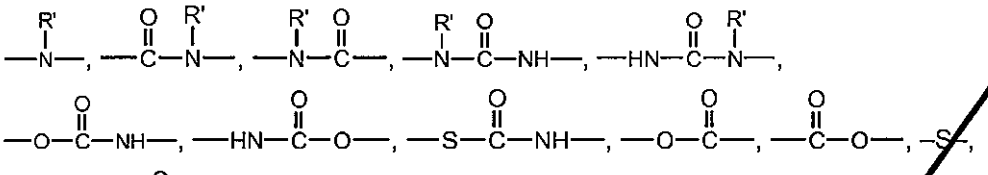
7. The amphiphilic branched prepolymer according to any one of claims 1 to 6, wherein the functional polysiloxane compound is defined by formula (1) or (2)

$$FG—G_1—PDMS—G_2—FG \qquad (1)$$

$$CR(—G_1—PDMS—G_2—FG)_{a1} \qquad (2)$$

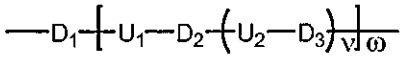
in which

G_1 and G_2 independent of each other are a linear or branched C_1–C_{10} alkylene divalent radical, a divalent radical of $-(alk'-O)_q-alk-$ in which q is an integer of from 1 to 5 and alk and alk' independent of each other is a C_1–C_6 alkylene divalent radical, or a divalent radical of $–R'_1–X_1–E–X_2–R'_2–$ in which R'_1 and R'_2 independent of each other is a linear or branched C_1–C_{10} alkylene divalent radical or a divalent radical of $-(alk'-O)_q-alk-$ as defined above, X_1 and X_2 independent of each other are a linkage selected from the group consisting of –O–,

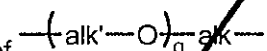


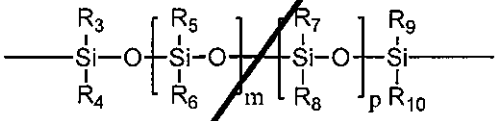
and —HN—C(=O)—S— in which R' is H or C_1-C_8 alkyl, E is an alkyl diradical, a cycloalkyl diradical, an alkylcycloalkyl diradical, an alkylaryl diradical, or an aryl diradical with up to 40 carbon atoms which may have ether, thio, or amine linkages in the main chain;

PDMS is a polysiloxane divalent radical of formula (3)



(3)

in which v is 0 or 1, ω is an integer of from 0 to 5, U_1 and U_2 independent of each other represent a divalent radical of $-R'_1-X_1-E-X_2-R'_2-$ as defined above or a divalent radical of  as defined above, D_1, D_2 and D_3 independently of each other are a divalent radical selected from the group consisting of $-(CH_2CH_2O)_t-CH_2CH_2-$ in which t is an integer of 3 to 40, $-CF_2-(OCF_2)_a-(OCF_2CF_2)_b-OCF_2-$ in which a and b independent of each other is an integer of 0 to 10 provided that a+b is a number in the range of 10 to 30, and a divalent group of formula (4)



(4)

in which R_3, R_4, R_5', R_6, R_7, R_8, R_9 and R_{10}, independently of one another, are C_1-C_{10} alkyl, C_1-C_{10} aminoalkyl, C_1-C_{10} hydroxyalkyl, C_1-C_{10} ether, C_1-C_4 alkyl- or C_1-C_4- alkoxy-substituted phenyl, C_1-C_{10} fluoroalkyl, C_1-C_{10} fluoroether, C_6-C_{18} aryl radical, cyano(C_1-C_{12}-alkyl), $-alk-(OCH_2CH_2)_n-OR_{11}$, in which alk is C_1-C_6 alkylene divalent radical, R_{11} is hydrogen or C_1-C_6 alkyl, and n is an integer of from 1 to 10; m and p independently of each other are an integer of from 0 to 350 and (m+p) is from 1 to 700, provided that at least one of D_1, D_2 and D_3 is represented by formula (3);

CR is a multivalent organic radical having a valence of a1;

a1 is an integer of 3, 4 or 5; and

FG is selected from the group consisting of amino group (-NHR' as defined above),

hydroxyl group, carboxylic acid group, acid halide groups (—COX, X= Cl, Br, or I), acid anhydrate group, aldehyde group, azlactone group, isocyanate group, epoxy group, aziridine group, thiol (-SH), and amide groups ($—CONH_2$).

8. The amphiphilic branched prepolymer of claim 7, wherein the partially ethylenically functionalized polysiloxane is obtained by reacting the first ethylenically functionalized vinylic monomer with the functional polysiloxane compound of formula (1) at a molar equivalent ratio of from about 70% to about 90%.

9. The amphiphilic branched prepolymer according to any one of claims 2 to 8, wherein the polymerizable composition comprises a bulky hydrophobic vinylic monomer selected from the group consisting of N-[tris(trimethylsiloxy)silylpropyl]-(meth)acrylamide; N-[tris(dimethylpropylsiloxy)-silylpropyl] (meth)acrylamide; N-[tris(dimethylphenylsiloxy)-silylpropyl] (meth)acrylamide; N-[tris(dimethylethylsiloxy)silylpropyl] (meth)acrylamide; N-(2-hydroxy-3-(3-(bis(trimethylsilyloxy)methylsilyl)propyloxy)propyl)-2-methyl acrylamide; N-(2-hydroxy-3-(3-(bis(trimethylsilyloxy)methylsilyl)propyloxy)propyl) acrylamide; N,N-bis[2-hydroxy-3-(3-(bis(trimethylsilyloxy)methylsilyl)propyloxy)propyl]-2-methyl acrylamide; N,N-bis[2-hydroxy-3-(3-(bis(trimethylsilyloxy)methylsilyl)propyloxy)propyl] acrylamide; N-(2-hydroxy-3-(3-(tris(trimethylsilyloxy)silyl)propyloxy)propyl)-2-methyl acrylamide; N-(2-hydroxy-3-(3-(tris(trimethylsilyloxy)silyl)propyloxy)propyl)acrylamide; N,N-bis[2-hydroxy-3-(3-(tris(trimethylsilyloxy)silyl)propyloxy)propyl]-2-methyl acrylamide; N,N-bis[2-hydroxy-3-(3-(tris(trimethylsilyloxy)silyl)propyloxy)propyl]acrylamide; N-[2-hydroxy-3-(3-(t-butyldimethylsilyl)propyloxy)propyl]-2-methyl acrylamide; N-[2-hydroxy-3-(3-(t-butyldimethylsilyl)propyloxy)propyl]acrylamide; N,N-bis[2-hydroxy-3-(3-(t-butyldimethylsilyl)propyloxy)propyl]-2-methyl acrylamide; N,N-bis[2-hydroxy-3-(3-(t-butyldimethylsilyl)propyloxy)propyl]acrylamide; 3-methacryloxy propylpentamethyldisiloxane; tris(trimethylsilyloxy)silylpropyl methacrylate (TRIS); (3-methacryloxy-2-hydroxypropyloxy)propylbis(trimethylsiloxy)methylsilane); (3-methacryloxy-2-hydroxypropyloxy)propyltris(trimethylsiloxy)silane; 3-methacryloxy-2-(2-hydroxyethoxy)-propyloxy)propylbis(trimethylsiloxy)methylsilane; N-2-methacryloxyethyl-O-(methyl-bis-trimethylsiloxy-3-propyl)silyl carbamate; 3-(trimethylsilyl)propylvinyl carbonate; 3-(vinyloxycarbonylthio)propyl-tris(trimethyl-siloxy)silane; 3-[tris(trimethylsiloxy)silyl]propylvinyl carbamate; 3-[tris(trimethylsiloxy)silyl] propyl allyl carbamate; 3-[tris(trimethylsiloxy)silyl]propyl vinyl carbonate; t-butyldimethyl-siloxyethyl vinyl carbonate; trimethylsilylethyl vinyl carbonate; trimethylsilylmethyl vinyl carbonate; t-butyl (meth)acrylate, cyclohexylacrylate, isobornyl methacrylate, a polysiloxane-containing vinylic monomer

having 3 to 8 silicone atoms, and combinations thereof.

10. The amphiphilic branched prepolymer according to any one of claims 2 to 9, wherein the first reactive functional group, the second reactive functional groups of the functional polysiloxane compound, the third reactive functional group of the chain transfer agent, and the fourth reactive functional group, independently of each other, are selected from the group consisting of amino group (-NHR' as defined above), hydroxyl group, carboxylic acid group, acid halide groups (—COX, X= Cl, Br, or I), acid anhydrate group, aldehyde group, azlactone group, isocyanate group, epoxy group, aziridine group, amide groups ($—CONH_2$), and combinations thereof, more preferably selected from the group consisting of amino group (-NHR as defined above), hydroxyl group, carboxylic acid group, acid halide groups (—COX, X= Cl, Br, or I), azlactone group, isocyanate group, epoxy group, aziridine group, and combinations thereof, provided that one first or fourth reactive functional group can react with one second or third reactive functional group in the presence or absence of a coupling agent to form a covalent linkage.

11. The amphiphilic branched prepolymer according to any one of claims 2 to 10, wherein the first and second ethylenically functionalizing vinylic monomers independently of each other are selected from the group consisting of C_1 to C_6 hydroxylalkyl (meth)acrylate, C_1 to C_6 hydroxyalkyl (meth)acrylamide, C_1 to C_6 aminoalkyl (meth)acrylate, allylalcohol, allylamine, C_1 to C_6 aminoalkyl (meth)acrylamide, aziridinyl C_1-C_{12} alkyl (meth)acrylate (e.g., 2-(1-aziridinyl) ethyl (meth)acrylate, 3-(1-aziridinyl) propyl (meth)acrylate, 4-(1-aziridinyl) butyl (meth)acrylate, 6-(1-aziridinyl) hexyl (meth)acrylate, or 8-(1-aziridinyl) octyl (meth)acrylate), glycidyl (meth)acrylate, C_1 to C_6 alkly (meth)acrylic acid, (meth)acrylic acid halide (—COX, X= Cl, Br, or I), C_1 to C_6 isocyanatoalkyl (meth)acrylate, 2-vinyl-4,4-dimethyl-1,3-oxazolin-5-one, 2-isopropenyl-4,4-dimethyl-1,3-oxazolin-5-one, 2-vinyl-4-methyl-4-ethyl-1,3-oxazolin-5-one, 2-isopropenyl-4-methyl-4-butyl-1,3-oxazolin-5-one, 2-vinyl-4,4-dibutyl-1,3-oxazolin-5-one, 2-isopropenyl-4-methyl-4-dodecyl-1,3-oxazolin-5-one, 2-isopropenyl-4,4-diphenyl-1,3-oxazolin-5-one, 2-isopropenyl-4,4-pentamethylene-1,3-oxazolin-5-one, 2-isopropenyl-4,4-tetramethylene-1,3-oxazolin-5-one, 2-vinyl-4,4-diethyl-1,3-oxazolin-5-one, 2-vinyl-4-methyl-4-nonyl-1,3-oxazolin-5-one, 2-isopropenyl-4-methyl-4-phenyl-1,3-oxazolin-5-one, 2-isopropenyl-4-methyl-4-benzyl-1,3-oxazolin-5-one, 2-vinyl-4,4-pentamethylene-1,3-oxazolin-5-one, and 2-vinyl-4,4-dimethyl-1,3-oxazolin-6-one, with 2-vinyl-4,4-dimethyl-1,3-oxazolin-5-one (VDMO), 2-isopropenyl-4,4-dimethyl-1,3-oxazolin-5-one (IPDMO), and combinations thereof.

12. A method for making silicone hydrogel contact lenses, comprising the steps of:

(i) obtaining an amphiphilic branched polysiloxane prepolymer of any one of claims 1 to 11;

(ii) using the amphiphilic branched polysiloxane prepolymer to prepare a lens-forming composition which comprises

(a) from about 60% to about 99%, preferably from about 75% to about 95%, more preferably from about 85% to about 95%, by weight of the amphiphilic branched polysiloxane prepolymer,

(b) from about 0.1% to about 5% by weight of a free-radical initiator, and

(c) from 0 to about 20% by weight of at least one polymerizable component selected from the group consisting of a hydrophilic vinylic monomer, a silicone-containing vinylic monomer, a silicone-containing vinylic macromer with one sole ethylenically-unsaturated group, a hydrophobic vinylic monomer, a linear polysiloxane crosslinker terminated with two ethylenically-unsaturated groups, a crosslinking agent having a molecular weight of less than 700 Daltons, a polymerizable UV-absorbing agent, and mixtures thereof;

wherein the percentages by weight of components (a)-(c) are relative to the total amount of all polymerizable components (including those not listed above) in the lens-forming composition;

(iii) introducing the lens-forming composition into a mold, wherein the mold has a first mold half with a first molding surface defining the anterior surface of a contact lens and a second mold half with a second molding surface defining the posterior surface of the contact lens, wherein said first and second mold halves are configured to receive each other such that a cavity for receiving the lens-forming material is formed between said first and second molding surfaces; and

(iv) polymerizing the lens-forming material in the cavity to form a silicone hydrogel contact lens.

13. The method of claim 12, wherein the amphiphilic branched polysiloxane prepolymer is obtained according to a process comprising the steps of:

(i) obtaining a partially ethylenically-functionalized polysiloxane, wherein the partially ethylenically-functionalized polysiloxane is a mixture of reaction products obtained by reacting a first functionalizing vinylic monomer having a first reactive functional group with a functional polysiloxane compound having two or more second reactive functional groups at a molar equivalent ratio of from about 40% to about 95%, wherein each first reactive functional group reacts with one second reactive functional group in the presence or absence of a coupling agent to form a covalent bond or linkage, wherein the mixture of reaction product comprises at least one

polysiloxane crosslinkers having at least two ethylenically unsaturated groups and at least one polysiloxane vinylic monomer or macromer having at least one second reactive functional group and at least one ethylenically unsaturated group;

(ii) using the amphiphilic branched polysiloxane copolymer to prepare a polymerizable composition, wherein the polymerizable composition comprises at least one hydrophilic vinylic monomer, a chain transfer agent which is not a RAFT agent and optionally (but preferably) includes a third reactive functional group, and a free-radical initiator;

(iii) polymerizing the polymerizable composition to form an amphiphilic branched polysiloxane copolymer comprising hydrophilic monomeric units derived from said at least one hydrophilic vinylic monomer, polysiloxane crosslinking units derived from the polysiloxane crosslinker, dangling polysiloxane chains each terminated with a second reactive functional group and derived from the polysiloxane vinylic monomer or macromer, and chain transfer units with or without third reactive functional groups derived from the chain transfer agent;

(iv) reacting the branched polysiloxane copolymer with a second ethylenically functionalizing vinylic monomer having a fourth reactive functional group which reacts with one second or third reactive functional group of the branched polysiloxane copolymer in the presence or absence of a coupling agent to form a covalent linkage, thereby forming the amphiphilic branched polysiloxane prepolymer having dangling polysiloxane chains each of which is terminated with one ethylenically-unsaturated group.

14. The method of claim 12 or 13, wherein the mold is a reusable mold, wherein the lens-forming material in the cavity is cured actinically under a spatial limitation of actinic radiation to form a silicone hydrogel contact lens.

15. A silicone hydrogel contact lens comprising a polymeric material which is a polymerization product of a lens-forming composition including an amphiphilic branched polysiloxane prepolymer of any one of claims 1 to 12.

What is claimed is:

1. An amphiphilic branched prepolymer which is obtained by:

(i) polymerizing a polymerizable composition to obtain an amphiphilic branched polysiloxane copolymer, wherein the polymerizable composition comprises

(a) from about 10% to about 94% by weight of a partially ethylenically-functionalized polysiloxane, wherein the partially ethylenically-functionalized polysiloxane is a mixture of reaction products obtained by reacting a first ethyleincally functionalizing vinylic monomer having a first reactive functional group with a functional polysiloxane compound having two or more second reactive functional groups at a molar equivalent ratio, $R_{Equivalent}$ of from about 40% to about 95%, wherein each first reactive functional group reacts with one second reactive functional group in the presence or absence of a coupling agent to form a covalent bond or linkage, wherein the mixture of reaction product comprises at least one polysiloxane crosslinkers having at least two ethylenically unsaturated groups and at least one polysiloxane vinylic monomer or macromer having at least one second reactive functional group and at least one ethylenically unsaturated group,

(b) at least one hydrophilic vinylic monomer,

(c) optionally a hydrophobic vinylic monomer,

(d) a chain transfer agent other than a RAFT agent, wherein the chain transfer agent optionally including a third reactive functional group, and

(e) a free-radical initiator; and

(ii) ethylenically functionalizing the amphiphilic branched polysiloxane copolymer by reacting it with a second ethylenically functionalizing vinylic monomer having a fourth reactive functional group which reacts with one second or third reactive functional group in the presence or absence of a coupling agent to form a covalent linkage, thereby forming the amphiphilic branched polysiloxane prepolymer.

2. The amphiphilic branched prepolymer of claim 1, wherein the polymerizable composition comprising:

(a) from about 20% to about 80% by weight of the partially ethylenically-functionalized polysiloxane;

(b) from about 5% to about 75% by weight of at least one hydrophilic vinylic monomer;

(c) from 0 to about 55% by weight of a bulky hydrophobic vinylic monomer;

(d) from about 0.25% to about 5% by weight of a chain transfer agent other than a RAFT agent, wherein the chain transfer agent optionally including a reactive functional group;

(e) from 0 to 5% by weight by weight of a polymerizable UV-abosorbing compound; and

(f) from about 0.1% to about 5% by weight of a free radical initiator,

wherein the percentages by weight of the above-listed components are relative to the combined weight of all polymerizable components.

3. The amphiphilic branched prepolymer of claim 1, wherein the hydrophilic vinylic monomer is free of reactive functional group capable of participating in a coupling reaction with the second ethylenically functionalizing vinylic monomer.

4. The amphiphilic branched prepolymer of claim 1, wherein the polymerizable composition comprises a first hydrophilic vinylic monomer free of any reactive functional group capable of participating in a coupling reaction with the second ethylenically functionalizing vinylic monomer and a second hydrophilic vinylic monomer having a reactive functional group capable of participating the coupling reaction with the second ethylenically functionalizing vinylic monomer, wherein the first and second hydrophilic vinylic monomers are present in the polymerizable composition at a ratio of from about 5:1 to about 30:1.

5. The amphiphilic branched prepolymer of claim 2, wherein the hydrophilic vinylic monomer is free of reactive functional group capable of participating in a coupling reaction with the second ethylenically functionalizing vinylic monomer.

6. The amphiphilic branched prepolymer of claim 2, wherein the polymerizable composition comprises a first hydrophilic vinylic monomer free of any reactive functional group capable of participating in a coupling reaction with the second ethylenically functionalizing vinylic monomer and a second hydrophilic vinylic monomer having a reactive functional group capable of participating the coupling reaction with the second ethylenically functionalizing vinylic monomer, wherein the first and second hydrophilic vinylic monomers are present in the polymerizable composition at a ratio of from about 5:1 to about 30:1.

7. The amphiphilic branched prepolymer of claim 4, wherein the first hydrophilic vinylic monomer is selected from the group consisting of N,N-dimethyl (meth)acrylamide, N-methyl-3-methylene-2-pyrrolidone, 1-ethyl-3-methylene-2-pyrrolidone, 1-methyl-5-methylene-2-pyrrolidone, 1-ethyl-5-methylene-2-pyrrolidone, 5-methyl-3-methylene-2-pyrrolidone, 5-ethyl-3-methylene-2-pyrrolidone, 1-n-propyl-3-methylene-2-pyrrolidone, 1-n-propyl-5-methylene-2-pyrrolidone, 1-isopropyl-3-methylene-2-pyrrolidone, 1-isopropyl-5-methylene-2-pyrrolidone, 1-n-butyl-3-methylene-2-pyrrolidone, 1-tert-butyl-3-methylene-2-pyrrolidone, dimethylaminoethyl (meth)acrylate, N-vinyl-2-pyrrolidone, a C_1,C_4-alkoxy polyethylene glycol (meth)acrylate, N-vinyl formamide, N-vinyl acetamide, N-vinyl isopropylamide, N-vinyl-N-methyl acetamide, and mixtures thereof; and wherein the second hydrophilic vinylic monomer is selected from the group consisting of hydroxyl-substituted C_1-C_4 alkyl (meth)acrylate, hydroxyl-substituted C_1-C_4 alkyl (meth)acrylamide, amino-substituted C_1-C_4 alkyl (meth)acrylate, amino-substituted C_1-C_4 alkyl (meth)acrylamide, allyl alcohol, allyl amine, and mixture thereof.

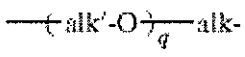
8. The amphiphilic branched prepolymer of claim 7, wherein the functional polysiloxane compound is defined by formula (1) or (2)

$$FG\text{-}G_1\text{-}PDMS\text{-}G_2\text{-}FG \quad (1)$$

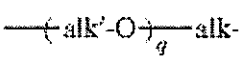
$$CR\{\text{-}G_1\text{-}PDMS\text{-}G_2\text{-}FG)_{a1} \quad (2)$$

in which

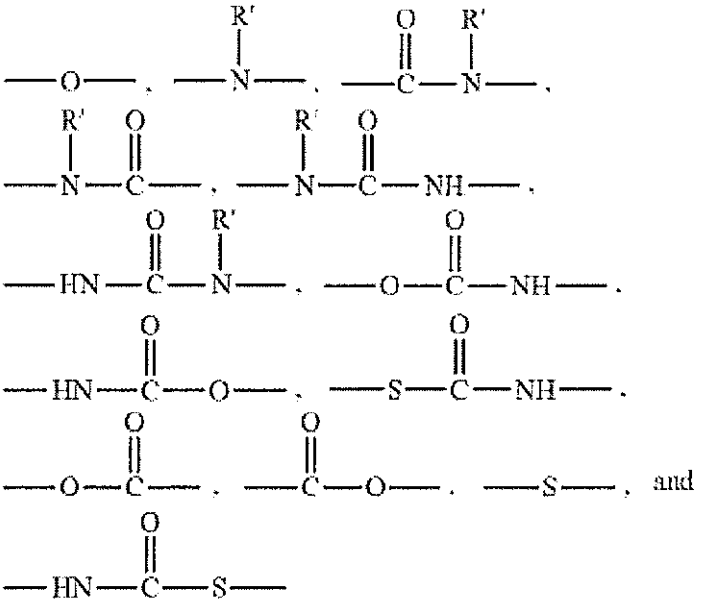
G_1 and G_2 independent of each other are a linear or branched C_1-C_{10} alkylene divalent radical, a divalent radical of



in which q is an integer of from 1 to 5 and alk and alk' independent of each other is a C_1-C_6 alkylene divalent radical, or a divalent radical of —R'_1—X_1-E-X_2—R'_2— in which R'_1 and R'_2 independent of each other is a linear or branched C_1-C_{10} alkylene divalent radical or a divalent radical of

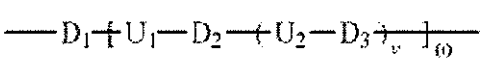


as defined above, X_1 and X_2 independent of each other are a linkage selected from the group consisting of



in which R' is H or C_1-C_8 alkyl, E is an alkyl diradical, a cycloalkyl diradical, an alkylcycloalkyl diradical, an alkylaryl diradical, or an aryl diradical with up to 40 carbon atoms which may have ether, thio, or amine linkages in the main chain;

PDMS is a polysiloxane divalent radical of formula (3)

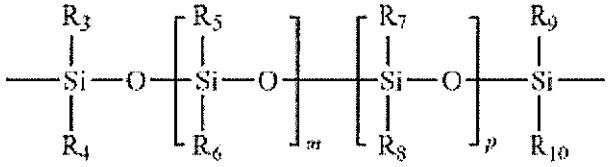


(3)

in which v is 0 or 1, ω is an integer of from 0 to 5, U_1 and U_2 independent of each other represent a divalent radical of $—R'_1—X_1\text{-}E\text{-}X_2—R'_2—$ as defined above or a divalent radical of

as defined above, D_1, D_2 and D_3 independently of each other are a divalent radical selected from the group consisting of $—(CH_2CH_2O)_t—CH_2CH_2—$ in which t is an integer of 3 to 40, $—CF_2—(OCF_2)_a—(OCF_2CF_2)_b—OCF_2—$ in which a and b independent of each other is an integer of 0 to 10 provided that a+b is a number in the range of 10 to 30, and a divalent group of formula (4)

(4)



in which R_3, R_4, R_5, R_6, R_7, R_8, R_9 and R_{10}, independently of one another, are C_1-C_{10} alkyl, C_1-C_{10} aminoalkyl, C_1-C_{10} hydroxyalkyl, C_1-C_{10} ether, C_1-C_4 alkyl- or C_1-C_4-alkoxy-substituted phenyl, C_1-C_{10} fluoroalkyl, C_1-C_{10}fluoroether, C_6-C_{18} aryl radical, cyano(C_1-C_{12}-alkyl), $-alk\text{-}(OCH_2CH_2)_n—OR_{11}$, in which alk is C_1-C_6 alkylene divalent radical, R_{11} is hydrogen or C_1-C_6 alkyl, and n is an integer of from 1 to 10; m and p independently of each other are an integer of from 0 to 350 and (m+p) is from 1 to 700, provided that at least one of D_1, D_2 and D_3 is represented by formula (3);

CR is a multivalent organic radical having a valence of a1;

a1 is an integer of 3, 4 or 5; and

FG is selected from the group consisting of amino group (—NHR' as defined above), hydroxyl group, carboxylic acid group, acid halide groups (—COX, X=Cl, Br, or I), acid anhydrate group, aldehyde group, azlactone group, isocyanate group, epoxy group, aziridine group, thiol (—SH), and amide groups ($—CONH_2$).

9. The amphiphilic branched prepolymer of claim 8, wherein the partially ethylenically functionalized polysiloxane is obtained by reacting the first ethylenically functionalized vinylic monomer with the functional polysiloxane compound of formula (1) at a molar equivalent ratio of from about 70% to about 90%.

10. The amphiphilic branched prepolymer of claim 8, wherein the polymerizable composition comprises a bulky hydrophobic vinylic monomer selected from the group consisting of N-[tris(trimethylsiloxy)silylpropyl]-(meth)acrylamide; N -[tris(dimethylpropylsiloxy)-silylpropyl] (meth) acrylamide; N-[tris(dimethylphenylsiloxy) -silylpropyl] (meth)acrylamide; N-[tris(dimethylethylsiloxy)silylpropyl] (meth)acrylamide; N-(2-hydroxy-3-(3-(bis(trimethylsilyloxy)methylsilyl)propyloxy)propyl)-2-methyl acrylamide; N-(2-hydroxy-3-(3-(bis(trimethylsilyloxy)methylsilyl)propyloxy)propyl) acrylamide; N,N-bis[2-hydroxy-3-(3-(bis (trimethylsilyloxy)methylsilyl)propyloxy)propyl]-2-methyl acrylamide; N,N-bis[2-hydroxy-3-(3-(bis(trimethylsilyloxy) methylsilyl)propyloxy)propyl] acrylamide; N-(2-hydroxy-3-(3-(tris(trimethylsilyloxy)silyl)propyloxy)propyl)-2-methyl acrylamide; N-(2-hydroxy-3-(3-(tris(trimethylsilyloxy)silyl) propyloxy)propyl)acrylamide; N,N-bis[2-hydroxy-3-(3-(tris (trimethylsilyloxy)silyl)propyloxy)propyl]-2-methyl acrylamide; N,N-bis[2-hydroxy-3-(3-(tris(trimethylsilyloxy)silyl) propyloxy)propyl]acrylamide; N-[2-hydroxy-3-(3-(t-butyldimethylsilyl)propyloxy)propyl]-2-methyl acrylamide; N-[2-hydroxy-3-(3-(t-butyldimethylsilyl)propyloxy)propyl] acrylamide; N,N-bis[2-hydroxy-3-(3-(t-butyldimethylsilyl) propyloxy)propyl]-2-methyl acrylamide; N,N-bis[2-hydroxy-3-(3-(t-butyldimethylsilyl)propyloxy)propyl] acrylamide; 3-methacryloxy propylpentamethyldisiloxane; tris(trimethylsilyloxy)silylpropyl methacrylate (TRIS); (3-methacryloxy-2-hydroxypropyloxy)propylbis(trimethylsiloxy)methylsilane); (3-methacryloxy-2-hydroxypropyloxy)propyltris(trimethylsiloxy)silane; 3-methacryloxy-2-(2-hydroxyethoxy)-propyloxy)propylbis(trimethylsiloxy) methylsilane; N-2-methacryloxyethyl-O-(methyl-bis-trimethylsiloxy-3-propyl)silyl carbamate; 3-(trimethylsilyl)

propylvinyl carbonate; 3-(vinyloxycarbonylthio)propyl-tris (trimethyl-siloxy)silane; 3-[tris(trimethylsiloxy)silyl] propylvinyl carbamate; 3-[tris(trimethylsiloxy)silyl] propyl allyl carbamate; 3-[tris(trimethylsiloxy)silyl]propyl vinyl carbonate; t-butyldimethyl-siloxyethyl vinyl carbonate; trimethylsilylethyl vinyl carbonate; trimethylsilylmethyl vinyl carbonate; t-butyl (meth)acrylate, cyclohexylacrylate, isobornyl methacrylate, a polysiloxane-containing vinylic monomer having 3 to 8 silicone atoms, and combinations thereof.

11. The amphiphilic branched prepolymer of claim **10**, wherein the first reactive functional group, the second reactive functional groups of the functional polysiloxane compound, the third reactive functional group of the chain transfer agent, and the fourth reactive functional group, independently of each other, are selected from the group consisting of amino group (—NHR' as defined above), hydroxyl group, carboxylic acid group, acid halide groups (—COX, X=Cl, Br, or I), acid anhydrate group, aldehyde group, azlactone group, isocyanate group, epoxy group, aziridine group, amide groups ($—CONH_2$), and combinations thereof, provided that one first or fourth reactive functional group can react with one second or third reactive functional group in the presence or absence of a coupling agent to form a covalent linkage.

12. The amphiphilic branched prepolymer of claim 11, wherein the first and second ethylenically functionalizing vinylic monomers independently of each other are selected from the group consisting of C_1 to C_6 hydroxylalkyl (meth) acrylate, C_1 to C_6 hydroxyalkyl (meth)acrylamide, C_1 to C_6 aminoalkyl (meth)acrylate, allylalcohol, allylamine, C_1 to C_6 aminoalkyl (meth)acrylamide, aziridinyl C_1-C_{12} alkyl (meth) acrylate (e.g., 2-(1-aziridinyl) ethyl (meth)acrylate, 3-(1-aziridinyl) propyl (meth)acrylate, 4-(1-aziridinyl) butyl (meth)acrylate, 6-(1-aziridinyl) hexyl (meth)acrylate, or 8-(1-axiridinyl) octyl (meth)acrylate), glycidyl (meth)acrylate, C_1 to C_6 alkly (meth)acrylic acid, (meth)acrylic acid halide (—COX, X=Cl, Br, or I), C_1 to C_6 isocyanatoalkyl (meth)acrylate, 2-vinyl-4,4-dimethyl-1,3-oxazolin-5-one, 2-isopropenyl-4,4-dimethyl-1,3-oxazolin-5-one, 2-vinyl-4-methyl-4-ethyl-1,3-oxazolin-5-one, 2-isopropenyl-4-methyl-4-butyl-1,3-oxazolin-5-one, 2-vinyl-4,4-dibutyl-1,3-oxazolin-5-one, 2-isopropenyl-4-methyl-4-dodecyl-1,3-oxazolin-5-one, 2-isopropenyl-4,4-diphenyl-1,3-oxazolin-5-one, 2-isopropenyl-4,4-pentamethylene-1,3-oxazolin-5-one, 2-isopropenyl-4,4-tetramethylene-1,3-oxazolin-5-one, 2-vinyl-4,4-diethyl-1,3-oxazolin-5-one, 2-vinyl-4-methyl-4-nonyl-1,3-oxazolin-5-one, 2-isopropenyl-4-methyl-4-phenyl-1,3-oxazolin-5-one, 2-isopropenyl-4-methyl-4-benzyl-1,3-oxazolin-5-one, 2-vinyl-4,4-pentamethylene-1,3-oxazolin-5-one, and 2-vinyl-4,4-dimethyl-1,3-oxazolin-6-one, with 2-vinyl-4,4-dimethyl-1,3-oxazolin-5-one (VDMO), 2-isopropenyl-4,4-dimethyl-1,3-oxazolin-5-one (IPDMO), and combinations thereof.

13. A method for making silicone hydrogel contact lenses, comprising the steps of:

(i) obtaining an amphiphilic branched polysiloxane prepolymer which comprises (a) from about 5% to about 75% by weight of hydrophilic monomeric units derived from at least one hydrophilic vinylic monomer, (b) from about 1% to about 85% by weight of polysiloxane crosslinking units derived from at least one polysiloxane crosslinker having two or more terminal ethylenically-unsaturated groups, (c) from about 2% to about 48% by weight of dangling polysiloxane chains each of which is terminated with an ethylenically unsaturated group, and (d) from about 0.25% to about 5% by weight of chain-transfer units derived from a chain transfer agent other

than a RAFT agent, wherein the amphiphilic branched polysiloxane prepolymer is obtained according to a process comprising the steps of:

(a) obtaining a partially ethylenically-functionalized polysiloxane, wherein the partially ethylenically-functionalized polysiloxane is a mixture of reaction products obtained by reacting a first ethylenically-functionalizing vinylic monomer having a first reactive functional group with a functional polysiloxane compound having two or more second reactive functional groups at a molar equivalent ratio of from about 40% to about 95%, wherein each first reactive functional group reacts with one second reactive functional group in the presence or absence of a coupling agent to form a covalent bond or linkage, wherein the mixture of reaction product comprises at least one polysiloxane crosslinkers having at least two ethylenically unsaturated groups and at least one polysiloxane vinylic monomer or macromer having at least one second reactive functional group and at least one ethylenically unsaturated group,

(b) using the partially ethylenically-functionalized polysiloxane to prepare a polymerizable composition, wherein the polymerizable composition comprises at least one hydrophilic vinylic monomer, a chain transfer agent which is not a RAFT agent and optionally includes a third reactive functional group, and a free-radical initiator,

(c) polymerizing the polymerizable composition to form an amphiphilic branched polysiloxane copolymer comprising hydrophilic monomeric units derived from said at least one hydrophilic vinylic monomer, polysiloxane crosslinking units derived from the polysiloxane crosslinker, dangling polysiloxane chains each terminated with a second reactive functional group and derived from the polysiloxane vinylic monomer or macromer having at least one second reactive functional group and at least one ethylenically unsaturated group, and chain transfer units with or without third reactive functional groups derived from the chain transfer agent, and

(d) reacting the amphiphilic branched polysiloxane copolymer with a second ethylenically functionalizing vinylic monomer having a fourth reactive functional group which reacts with one second or third reactive functional group of the branched polysiloxane copolymer in the presence or absence of a coupling agent to form a covalent linkage, thereby forming the amphiphilic branched polysiloxane prepolymer having dangling polysiloxane chains each of which is terminated with one ethylenically-unsaturated group;

(ii) using the amphiphilic branched polysiloxane prepolymer to prepare a lens-forming composition which comprises

(a) from about 60% to about 99% by weight of the amphiphilic branched polysiloxane prepolymer,

(b) from about 0.1% to about 5% by weight of a free-radical initiator, and

(c) from 0 to about 20% by weight of at least one polymerizable component selected from the group consisting of a hydrophilic vinylic monomer, a silicone-containing vinylic monomer, a silicone-containing vinylic macromer with one sole ethylenically-unsaturated group, a hydrophobic vinylic monomer, a linear polysiloxane crosslinker terminated with two ethylenically-unsaturated groups, a crosslinking agent having a molecular weight of less than 700 Daltons, a polymerizable UV-absorbing agent, and mixtures thereof;

wherein the percentages by weight of components (a)-(c) are relative to the total amount of all polymerizable components (including those not listed above) in the lens-forming composition;

(iii) introducing the lens-forming composition into a mold, wherein the mold has a first mold half with a first molding surface defining the anterior surface of a contact lens and a second mold half with a second molding surface defining the posterior surface of the contact lens, wherein said first and second mold halves are configured to receive each other such that a cavity for receiving the lens-forming material is formed between said first and second molding surfaces; and

(iv) polymerizing the lens-forming material in the cavity to form a silicone hydrogel contact lens.

14. The method of claim **13**, wherein the mold is a reusable mold, wherein the lens-forming material in the cavity is cured actinically under a spatial limitation of actinic radiation to form a silicone hydrogel contact lens.

15. A silicone hydrogel contact lens comprising a polymeric material which is a polymerization product of a lens-forming composition including an amphiphilic branched polysiloxane prepolymer of claim 1.