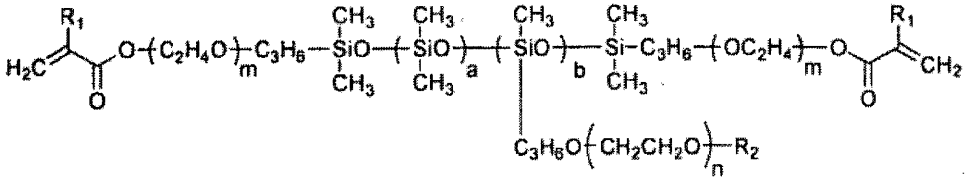
WHAT IS CLAIMED IS:

1. A silicone hydrogel contact lens comprising:

a polymeric lens body that is the reaction product of a polymerizable composition comprising:

a) at least one mono-functional acrylate-containing siloxane monomer having a molecular weight of less than 1000;

b) at least one bi-functional acrylate-containing siloxane monomer represented by formula (II),



(II)

wherein R_1 of formula (II) is selected from either hydrogen or a methyl group, R_2 of formula (II) is selected from either hydrogen or a C_{1-4} hydrocarbon group, m of formula (II) represents an integer of from 0 to 10; n of formula (II) represents an integer of from 4 to 100, and a and b represent integers of 1 or more;

c) at least one hydrophilic vinyl-containing monomer; and

d) at least one vinyl-containing cross-linking agent,

wherein the polymerizable composition has a molar ratio of total amount of hydrophilic vinyl-containing monomer to total amount of acrylate-containing siloxane monomer of from 5:1 to 30:1, respectively; and

wherein the polymerizable composition has a molar ratio of total amount of polymerizable vinyl groups from the total amount of hydrophilic vinyl-containing monomer to total amount of polymerizable vinyl groups from the total amount of vinyl-containing cross-linking agents of from 100:1 to 1000:1, respectively.

2. The contact lens of claim 1, wherein the at least one hydrophilic vinyl-containing monomer is selected from N-vinyl-N-methyl acetamide (VMA), or N-vinyl pyrrolidone (NVP), or 1,4-butanediol vinyl ether (BVE), or ethylene glycol vinyl ether (EGVE), or diethylene glycol vinyl ether (DEGVE), or any combination thereof.

3. The contact lens of claim 1 ~~or claim 2~~, wherein the at least one vinyl-containing cross-linking agent is selected from divinyl ether, or divinyl sulfone, or triallyl phthalate, or triallyl isocyanurate, or diallyl phthalate, or diethyleneglycol divinyl ether, or triethyleneglycol divinyl ether, or any combination thereof.

4. The contact lens of claim 1, wherein the at least one vinyl-containing cross-linking agent is a divinyl ether.

~~5. The contact lens of claim 1, wherein the polymerizable composition has a molar ratio of total amount of polymerizable vinyl groups from the total amount of hydrophilic vinyl-containing monomer to total amount of polymerizable vinyl groups from the total amount of vinyl-containing cross-linking agents of from 100:1 to 1000:1, respectively.~~

~~6~~5. The contact lens of claim 1, wherein the bi-functional acrylate-containing siloxane monomer has a molecular weight of at least 3,000.

~~7~~6. The contact lens of claim 1, wherein the bi-functional acrylate-containing siloxane monomer has a molecular weight of at least 5,000.

~~8~~7. The contact lens of claim 1, wherein the mono-functional acrylate-containing siloxane monomer and the bi-functional acrylate-containing siloxane monomer are present in the polymerizable composition at a molar ratio of at least 30:1, respectively.

~~9~~8. The contact lens of claim 1, wherein the polymerizable composition further comprises at least one non-siloxane acrylate-containing monomer.

~~10~~9. The contact lens of claim ~~9~~8, wherein the at least one non-siloxane acrylate-containing monomer is selected from methyl methacrylate (MMA), or 2-hydroxybutyl methacrylate (HOB), or tert butyl methacrylate (tBMA), or N,N-dimethylacrylamide (DMA), or 2-hydroxyethyl methacrylate (HEMA), or ethoxyethyl methacrylamide (EOEMA), or ethylene glycol methyl ether methacrylate (EGMA), or isobornyl methacrylate (IBM), or any combination thereof.

~~11~~10. The contact lens of claim 1, wherein the polymerizable composition further comprises at least one acrylate-containing cross-linking agent.

~~12~~11. The contact lens of claim ~~11~~10, wherein the at least one acrylate-containing cross-linking agent is selected from triethylene glycol dimethacrylate, or ethylene glycol dimethacrylate, or a combination thereof.

~~13~~12. The contact lens of claim ~~11~~10 ~~or claim 12~~, wherein the polymerizable composition has a molar ratio of total amount of acrylate-containing cross-linking agent to total amount of vinyl-containing cross-linking agent of at least 3:2, respectively.

~~14~~13. The contact lens of claim ~~13~~12, wherein the polymerizable composition has a molar ratio of total amount of acrylate-containing cross-linking agent to total amount of vinyl-containing cross-linking agent of from 3:1 to 10:1, respectively.

~~15.~~14 The contact lens of claim 1, wherein the polymerizable composition is substantially free of hydrophilic polymer.

~~16.~~15 The contact lens of claim 1 that is free of post-polymerization surface modification.

~~17~~16. The contact lens of claim 1 having a wet extractable component of 2 to 8 wt. %.

~~18~~17. The contact lens of claim 1 characterized by one or more of the following physical characteristics:

a) a dynamic advancing contact angle of ≤ 70 ° as determined using a captive bubble method;

b) an oxygen permeability of at least 60 barrers;

c) a tensile modulus from about 0.2 MPa to about 0.9 MPa;

d) an equilibrium water content from about 30 % wt/wt to about 70 % wt/wt;

e) an ionoflux of less than $6x10^{-3}$ mm^2/min; and

f) an energy loss from about 27 to about 45 %.

~~19~~18. The contact lens of claim ~~19~~17, wherein the contact angle is ≤ 60 ° and the equilibrium water content is at least about 40 % wt/wt.

~~20~~19. A method of making the silicone hydrogel contact lens of claim 1 comprising:

a) polymerizing the polymerizable composition to form the polymeric lens body;

b) contacting the polymeric lens body with a washing liquid to remove unreacted or partially reacted components from the polymeric lens body; and

c) sealing the washed polymeric lens body in a package comprising a packaging solution; and

d) sterilizing the sealed package.

~~21~~20. The method of claim ~~20~~19, wherein the washing liquid and any other liquid used for washing the polymeric lens body are substantially free of volatile organic solvents.

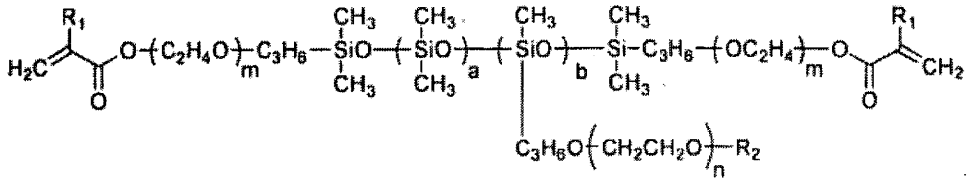
WHAT IS CLAIMED IS:

1. A silicone hydrogel contact lens comprising:

a polymeric lens body that is the reaction product of a polymerizable composition comprising:

a) at least one mono-functional acrylate-containing siloxane monomer having a molecular weight of less than 1000;

b) at least one bi-functional acrylate-containing siloxane monomer represented by formula (II),



(II)

wherein R_1 of formula (II) is selected from either hydrogen or a methyl group, R_2 of formula (II) is selected from either hydrogen or a C_{1-4} hydrocarbon group, m of formula (II) represents an integer of from 0 to 10; n of formula (II) represents an integer of from 4 to 100, and a and b represent integers of 1 or more;

c) at least one hydrophilic vinyl-containing monomer; and

d) at least one vinyl-containing cross-linking agent,

wherein the polymerizable composition has a molar ratio of total amount of hydrophilic vinyl-containing monomer to total amount of acrylate-containing siloxane monomer of from 5:1 to 30:1, respectively and

wherein the polymerizable composition has a molar ratio of total amount of polymerizable vinyl groups from the total amount of hydrophilic vinyl-containing monomer to total amount of polymerizable vinyl groups from the total amount of vinyl-containing cross-linking agents of from 100:1 to 1000:1, respectively.

2. The contact lens of claim 1, wherein the at least one hydrophilic vinyl-containing monomer is selected from N-vinyl-N-methyl acetamide (VMA), or N-vinyl pyrrolidone (NVP), or 1,4-butanediol vinyl ether (BVE), or ethylene glycol vinyl ether (EGVE), or diethylene glycol vinyl ether (DEGVE), or any combination thereof.

3. The contact lens of claim 1, wherein the at least one vinyl-containing cross-linking agent is selected from divinyl ether, or divinyl sulfone, or triallyl phthalate, or triallyl isocyanurate, or diallyl phthalate, or diethyleneglycol divinyl ether, or triethyleneglycol divinyl ether, or any combination thereof.

4. The contact lens of claim 1, wherein the at least one vinyl-containing cross-linking agent is a divinyl ether.

5. The contact lens of claim 1, wherein the bi-functional acrylate-containing siloxane monomer has a molecular weight of at least 3,000.

6. The contact lens of claim 1, wherein the bi-functional acrylate-containing siloxane monomer has a molecular weight of at least 5,000.

7. The contact lens of claim 1, wherein the mono-functional acrylate-containing siloxane monomer and the bi-functional acrylate-containing siloxane monomer are present in the polymerizable composition at a molar ratio of at least 30:1, respectively.

8. The contact lens of claim 1, wherein the polymerizable composition further comprises at least one non-siloxane acrylate-containing monomer.

9. The contact lens of claim 8, wherein the at least one non-siloxane acrylate-containing monomer is selected from methyl methacrylate (MMA), or 2-hydroxybutyl methacrylate (HOB), or tert butyl methacrylate (tBMA), or N,N-dimethylacrylamide (DMA), or 2-hydroxyethyl methacrylate (HEMA), or ethoxyethyl methacrylamide (EOEMA), or ethylene glycol methyl ether methacrylate (EGMA), or isobornyl methacrylate (IBM), or any combination thereof.

10. The contact lens of claim 1, wherein the polymerizable composition further comprises at least one acrylate-containing cross-linking agent.

11. The contact lens of claim 10, wherein the at least one acrylate-containing cross-linking agent is selected from triethylene glycol dimethacrylate, or ethylene glycol dimethacrylate, or a combination thereof.

12. The contact lens of claim 10, wherein the polymerizable composition has a molar ratio of total amount of acrylate-containing cross-linking agent to total amount of vinyl-containing cross-linking agent of at least 3:2, respectively.

13. The contact lens of claim 12, wherein the polymerizable composition has a molar ratio of total amount of acrylate-containing cross-linking agent to total amount of vinyl-containing cross-linking agent of from 3:1 to 10:1, respectively.

14 The contact lens of claim 1, wherein the polymerizable composition is substantially free of hydrophilic polymer.

15 The contact lens of claim 1 that is free of post-polymerization surface modification.

16. The contact lens of claim 1 having a wet extractable component of 2 to 8 wt. %.

17. The contact lens of claim 1 characterized by one or more of the following physical characteristics:

a) a dynamic advancing contact angle of $\leq 70°$ as determined using a captive bubble method;

b) an oxygen permeability of at least 60 barrers;

c) a tensile modulus from about 0.2 MPa to about 0.9 MPa;

d) an equilibrium water content from about 30 % wt/wt to about 70 % wt/wt;

e) an ionoflux of less than $6x10^{-3}$ mm^2/min; and

f) an energy loss from about 27 to about 45 %.

18. The contact lens of claim 17, wherein the contact angle is $\leq 60°$ and the equilibrium water content is at least about 40 % wt/wt.

19. A method of making the silicone hydrogel contact lens of claim 1 comprising:

a) polymerizing the polymerizable composition to form the polymeric lens body;

b) contacting the polymeric lens body with a washing liquid to remove unreacted or partially reacted components from the polymeric lens body; and

c) sealing the washed polymeric lens body in a package comprising a packaging solution; and

d) sterilizing the sealed package.

20. The method of claim 19, wherein the washing liquid and any other liquid used for washing the polymeric lens body are substantially free of volatile organic solvents.