Claims:

1. A method for producing embedded hydrogel contact lenses, comprising the steps of:

(1) obtaining a first female mold half, a first male mold half, a second female mold half, and a second male mold half, wherein the first female mold half has a first molding surface having a central portion defining the front surface of a to-be-molded insert, wherein the first male mold half has a second molding surface defining the back surface of the to-be-molded insert, wherein the second female mold half has a third molding surface defining the anterior surface of an embedded hydrogel contact lens, wherein the second male mold half has a fourth molding surface defining the posterior surface of the embedded hydrogel contact lens, wherein the first female mold half and the first male mold half are configured to receive each other such that a first molding cavity is formed between the central portion of the first molding surface and the second molding surfaces when the first female and first male mold halves are closed securely, wherein the first female mold half and the second male mold half are configured to receive each other such that a second molding cavity is formed between the first and fourth molding surfaces when the first female mold half is closed with the second male mold half, wherein the second female mold half and the second male mold half are configured to receive each other such that a third molding cavity is formed between the third and fourth molding surfaces when the second female mold half is closed securely with the second male mold half;

(2) dispensing an amount of an insert-forming composition on the central portion of the first molding surface of the first female mold half;

(3) placing the first male mold half on top of the insert-forming composition in the first female mold half and closing the first male mold half and the first female mold half to form a first molding assembly comprising the insert-forming composition therein;

(4) curing the insert-forming composition in the first molding assembly to form a molded insert that is made of a crosslinked polymeric material formed from the insert-forming composition and has the front surface defined by the central portion of the first molding surface and the back surface defined by the second molding surface;

(5) separating the first molding assembly obtained in step (4) into the first male mold half and the first female mold half with the molded insert adhered onto the central portion of the first molding surface of the first female mold half;

(6) dispensing an amount of a first lens-forming composition over the molded insert adhered on the central portion of the first molding surface in the first female mold half;

(7) placing the second male mold half on top of the first female mold half and closing the second male mold half and the first female mold half to form a second molding

assembly comprising the first lens-forming composition and the molded insert immersed therein in the second molding assembly;

(8) curing the first lens-forming composition in the second molding assembly to form a lens precursor having a convex surface defined by the first molding surface and an opposite concave surface that is defined by the fourth molding surface and is the posterior surface of the embedded hydrogel contact lens, wherein the lens precursor comprise a first hydrogel material formed from the first lens-forming composition and the insert embedded in the first material in such a way that the front surface of the insert merges with the convex surface of the lens precursor while the back surface of the insert is buried beneath the concave surface of the lens precursor;

(9) separating the second molding assembly obtained in step (8) into the second male mold half and the female mold half, with the lens precursor adhered on the second male mold half;

(10) dispensing an amount of a second lens-forming composition on the third molding surface of the second female mold half; over the molded insert adhered on the central portion of the first molding surface in the first female mold half;

(11) placing the second male mold half obtained in step (9) on top of the second female mold half and closing the second male mold half and the second female mold half to form a third molding assembly comprising the second lens-forming composition and the lens precursor immersed therein in the third molding assembly;

(12) curing the second lens-forming composition in the third molding assembly to form an embedded hydrogel contact lens that comprises the insert sandwiched between the first hydrogel material and a second hydrogel material formed from the second lens-forming composition;

(13) separating the third molding assembly obtained in step (12) into the second male mold half and the second female mold half, with the embedded hydrogel contact lens adhered on one of the second male mold half and the second female mold half;

(14) removing the embedded hydrogel contact lens from the lens-adhered mold half (preferably before the embedded hydrogel contact lens is contact with water or any liquid); and

(15) subjecting the embedded hydrogel contact lens to post-molding processes including a hydration process and one or more other processes selected from the group consisting of extraction, surface treatment, packaging, sterilization, and combinations thereof.

2. The method of claim 1, wherein the step of (4) curing the insert-forming composition is carried out photochemically by using UV and/or visible light.
3. The method of claim 1, wherein the step of (4) curing the insert-forming composition is carried out thermally by heating the first molding assembly in an oven at one or more curing temperature selected from about 40°C to about 100°C.
4. The method of any one of claims 1 to 3, wherein the step of (8) curing the first lens-forming composition is carried out photochemically by using UV and/or visible light.
5. The method of any one of claims 1 to 3, wherein the step of (8) curing the first lens-forming composition is carried out thermally by heating the second molding assembly in an oven at one or more curing temperature selected from about 40°C to about 100°C.
6. The method of any one of claims 1 to 5, wherein the step of (12) curing the second lens-forming composition is carried out photochemically by using UV and/or visible light.
7. The method of any one of claims 1 to 5, wherein the step of (12) curing the second lens-forming composition is carried out thermally by heating the second molding assembly in an oven at one or more curing temperature selected from about 40°C to about 100°C.
8. The method of any one of claims 1 to 7, wherein the first and second hydrogel materials are identical to each other or are different from each other.
9. The method of claim 8, wherein the first and second hydrogel materials are different from each other, wherein the second hydrogel material is softer than the first hydrogel material as measured by having a ratio of indentation depth ratio, $\frac{(Id)_{PS}}{(Id)_{AS}}$, of at least about 1.2, wherein $(Id)_{PS}$ is the indentation depth measured with a indenting probe having a tip radius of 9.5 μm and a stiffness of 0.54 N/m at 5 KPa compression pressure against the posterior surface in a nanoindentation test, wherein $(Id)_{AS}$ is the indentation depth measured with a indenting probe having a tip radius of 9.5 μm and a stiffness of 0.54 N/m at 5 KPa compression pressure against the anterior surface in a nanoindentation test.
10. The method of any one of claims 1 to 9, wherein the crosslinked polymeric material of the insert is a crosslinked silicone polymer that has three-dimensional polymer networks, is insoluble in water, and has an equilibrium water content of about 5% or less by weight.
11. The method of any one of claims 1 to 9, wherein the crosslinked polymeric material of the insert is a rigid gas permeable material.
12. The method of any one of claims 1 to 9, wherein the crosslinked polymeric material of

the insert is a hydrophobic crosslinked acrylic material that has an equilibrium water content of less than 5% by weight and comprises at least 55% by mole of repeating units of one or more acrylic monomers and/or one or more acrylic crosslinker and at least about 6% by mole of repeating units of at least one vinylic crosslinking agent.

13. The method of any one of claims 1 to 9, wherein the first and second hydrogel materials independent of each other are a non-silicone hydrogel material comprising at least 50% by mole of repeating units of at least one hydroxyl-containing vinylic monomer.

14. The method of any one of claims 1 to 9, wherein the first and second hydrogel materials independent of each other are a silicone hydrogel material, where the silicone hydrogel material comprises (a) repeating units of at least one first polysiloxane vinylic crosslinker and/or at least one siloxane-containing vinylic monomer and (b) repeating units of at least one hydrophilic vinylic monomer.

15. The method of claim 13 or 14, wherein the first and second hydrogel materials independently of each other in fully hydrated state have an equilibrium water content of from about 20% to about 70% by weight, an oxygen permeability of at least about 40 barrers, and a modulus (i.e., Young's modulus) of about 1.5 MPa or less.