Claims:

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

(1) obtaining a female mold half, a first male mold half and a second male mold half, wherein the female mold half has a first molding surface defining the anterior surface of a contact lens to be molded, wherein the first male mold half has a second molding surface defining the back surface of an insert to be molded, wherein the second male mold half has a third molding surface defining the posterior surface of the contact lens to be molded, wherein the first male mold half and the female mold half are configured to receive each other such that an insert-molding cavity is formed between the second molding surface and a central portion of the first molding surface when the female mold half is closed with the first male mold half, wherein the second male mold half and the female mold half are configured to receive each other such that a lens-molding cavity is formed between the first and third molding surfaces when the female mold half is closed 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 female mold half, wherein the insert-forming composition comprises at least 55% by mole of one or more acrylic monomers and/or one or more acrylic crosslinker;

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

(4) curing the insert-forming composition in the insert-molding cavity of the first molding assembly to form a molded insert;

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

(6) dispensing a lens-forming composition in the female mold half with the molded insert adhered thereon in an amount sufficient for filling the lens-molding cavity;

(7) placing the second male mold half on top of the lens-forming composition in the female mold half and closing the second male mold half and the female mold half to form a second molding assembly comprising the lens-forming composition and the molded insert immersed therein in the lens-molding cavity;

(8) curing the lens-forming composition in the lens-molding cavity of the second molding assembly to form an embedded hydrogel lens precursor that comprises a bulk hydrogel material formed from the lens-forming composition and the insert

completely or partially embedded in the bulk hydrogel material so that the back surface of the insert in buried at a depth of about 20 microns or larger beneath the posterior surface of the embedded hydrogel contact lens;

(9) separating the second molding assembly obtained in step (8) into the second male mold half and the female mold half, with the embedded hydrogel lens precursor adhered on a lens-adhered mold half which is one of the female and second male mold halves;

(10) removing the embedded hydrogel lens precursor from the lens-adhered mold half;

(11) subjecting the embedded hydrogel lens precursor to post-molding processes including a hydration process and one or more other processes selected from the group consisting of extraction, surface treatment, and combinations thereof to obtain an embedded hydrogel contact lens; and

(12) packaging and autoclaving the embedded hydrogel contact lens in a sealed package containing a packaging solution, wherein the embedded hydrogel contact lens is free of bubble when being inspected under microscopy at interfaces between the insert and the bulk material within the embedded hydrogel contact lens after being autoclaved.

2. The method of claim 1, wherein the first male mold half comprise an overflow groove which surrounds the molding surface and into which any excess insert-forming material is pressed when the first molding assembly is closed securely, wherein any flushes formed from the excess insert-forming material during step (4) can be stuck on the first male mold half during step of separating the first molding assembly halves, thereby removing the flushes.

3. The method of claim 1 or 2, wherein the front surface of the insert merges with or is buried at a depth of less than about 10 microns beneath the anterior surface of the contact lens, and the curvature of the front surface of the insert is identical to the curvature of a central zone, which has a diameter of the insert, of the anterior surface of the contact lens.

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

(1) obtaining a first female mold half, a male mold half and a second female mold half, wherein the first female mold half has a first molding surface defining the front surface of an insert to be molded, wherein the male mold half has a second molding surface defining the posterior surface of a contact lens to be molded, wherein the second female mold half has a third molding surface defining the anterior surface of the contact lens to be molded, wherein the first female mold half and the male mold half are configured to receive each other such that an insert-molding cavity is formed between the first molding surface and a central portion of

the second molding surface when the first female mold half is closed with the male mold half, wherein the second female mold half and the male mold half are configured to receive each other such that a lens-molding cavity is formed between the second and third molding surfaces when the second female mold half is closed with the male mold half;

(2) dispensing an amount of an insert-forming composition on the first molding surface of the first female mold half, wherein the insert-forming composition comprises at least 55% by mole of one or more acrylic monomers and/or one or more acrylic crosslinker;

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

(4) curing the insert-forming composition in the insert-molding cavity of the first molding assembly to form a molded insert;

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

(6) dispensing a lens-forming composition in the second female mold half in an amount sufficient for filling the lens-molding cavity;

(7) placing the male mold half with the molded insert adhered thereon on top of the lens-forming composition in the second female mold half and closing the second female mold half and the male mold half to form a second molding assembly comprising the lens-forming composition and the molded insert immersed therein in the lens-molding cavity;

(8) curing the lens-forming composition in the lens-molding cavity of the second molding assembly to form an embedded hydrogel lens precursor that comprises a bulk hydrogel material formed from the lens-forming composition and the insert completely or partially embedded in the bulk hydrogel material so that the front surface of the insert in buried at a depth of about 20 microns or larger beneath the anterior surface of the embedded hydrogel contact lens;

(9) separating the second molding assembly obtained in step (8) into the second female mold half and the male mold half, with the embedded hydrogel lens precursor adhered on a lens-adhered mold half which is one of the male and second female mold halves;

(10) removing the embedded hydrogel lens precursor from the lens-adhered mold half;

(11) subjecting the embedded hydrogel lens precursor to post-molding processes

including a hydration process and one or more other processes selected from the group consisting of extraction, surface treatment, and combinations thereof to obtain an embedded hydrogel contact lens; and

(12) packaging and autoclaving the embedded hydrogel contact lens in a sealed package containing a packaging solution, wherein the embedded hydrogel contact lens is free of bubble when being inspected under microscopy at interfaces between the insert and the bulk material within the embedded hydrogel contact lens after being autoclaved.

5. The method of claim 4, wherein the first female mold half comprise an overflow groove which surrounds the molding surface and into which any excess insert-forming material is pressed when the first molding assembly is closed securely, wherein any flushes formed from the excess insert-forming material during step (4) can be stuck on the first female mold half during step of separating the first molding assembly halves, thereby removing the flushes.

6. The method of claim 4 or 5, wherein the back surface of the insert merges with or is buried at a depth of less than about 10 microns beneath the posterior surface of the contact lens, and the curvature of the back surface of the insert is identical to the curvature of a central zone, which has a diameter of the insert, of the posterior surface of the contact lens.

7. The method of any one of claims 1 to 6, wherein the step of (4) curing the insert-forming composition is carried out actinically by using UV and/or visible light.

8. The method of any one of claims 1 to 6, 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.

9. The method of any one of claims 1 to 8, wherein the step of (8) curing the lens-forming composition is carried out actinically by using UV and/or visible light.

10. The method of any one of claims 1 to 8, wherein the step of (8) curing the lens-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.

11. The method of any one of claims 1 to 10, wherein the insert-forming composition comprises at least one polymerizable photochromic compound, at least one UV-absorbing vinylic monomer, at least one UV/HEVL-absorbing vinylic monomer, at least one fluorescent vinylic monomer, or combinations thereof.

12. The method of any one of claims 1 to 10, wherein the insert-forming composition comprises at least one color-filtering material for correcting color blindness, a diffractive material, a high refractive-index material, or combinations.

13. An embedded hydrogel contact lens, comprising:

an anterior surface, an opposite posterior surface, a bulk hydrogel material that is a silicone hydrogel material, and an insert completely or partially embedded in the bulk hydrogel material,

wherein the insert is made of a polymeric material different from the bulk hydrogel material and has a front surface, an opposite back surface and a diameter up to about 13.0 mm, wherein the polymeric material comprises at least 55% by mole of repeating units of one or more acrylic monomers and/or one or more acrylic crosslinker, wherein the insert is located in a central portion of the embedded hydrogel contact lens,

wherein one of the front and back surfaces of the insert is designated as an exposing surface while the other of the front and back surfaces is designated as a buried surface, wherein the exposing surface merges with or is buried at a depth of less than about 10 microns beneath the anterior or posterior surface the curvature of which in a central zone having a diameter of the insert is substantially identical to the curvature of the exposing surface, wherein the buried surface is buried at a depth of at least about 20 microns beneath either the anterior surface or the posterior surface,

wherein the embedded hydrogel contact lens is free of bubble when being inspected under microscopy at interfaces between the insert and the bulk material within the embedded hydrogel contact lens after being autoclaved in a packaging solution in a sealed package and then being stored for at least 3 weeks at 55°C, wherein the packaging solution is a phosphate buffered saline having a pH of 7.2±0.2.

14. The embedded hydrogel contact lens of claim 13, wherein the exposing surface merges with or is buried at a depth of less than about 10 microns beneath the anterior surface the curvature of which in the central zone having a diameter of the insert is substantially identical to the curvature of the exposing surface, wherein the buried surface is buried at a depth of at least about 20 microns beneath the posterior surface.

15. The embedded hydrogel contact lens of claim 13, wherein the exposing surface merges with or is buried at a depth of less than about 10 microns beneath the posterior surface the curvature of which in the central zone having a diameter of the insert is substantially identical to the curvature of the exposing surface, wherein the buried surface is buried at a depth of at least about 20 microns beneath the anterior surface.