Claims

1. A method of producing a silicone hydrogel contact lens mold assembly, the method comprising;

placing one of a male mold member and a female mold member on the other of a male mold member and a female mold member to form a contact lens mold assembly comprising a contact lens shaped cavity defined between the male mold member and the female mold member, said cavity containing a polymerizable silicone hydrogel contact lens precursor composition; and

coupling the male mold member and the female mold member together by inserting one or more heated elongate elements into the male and female mold members thereby causing a portion of the male and/or female mold members to become melted or softened, and then withdrawing said one or more heated elongate elements from the male and female mold members, wherein said melted or softened material then cools to form a weld between the male and female mold members; and wherein

throughout a first time period beginning when the first of said one or more heated elongate elements is inserted into the male and female mold members and continuing until at least 3 seconds after the last of said one or more heated elongate elements is withdrawn from the male and female mold members, the male and female mold members are pressed together by applying a force in the range of from 20 N to 100 N to the male and female mold members.

2. A method of producing a silicone hydrogel contact lens mold assembly according to claim 1, wherein said male mold member and said female mold member comprise, consist essentially of, or consist of polypropylene, and optionally, wherein said polypropylene has a Melt Flow Rate of 19 dg/min at 230°C and 2.16 kg.

3. A method of producing a silicone hydrogel contact lens mold assembly according to claim 2, wherein said polypropylene has a tensile modulus of 1800 MPa (measured at 1mm/min) and/or a flexural modulus of 1900 MPa (measured at 1%/minute), for example wherein said polypropylene is SABIC PP PCGH19.

4. A method of producing a silicone hydrogel contact lens mold assembly according to any previous claim, wherein said first time period continues until at least 5 seconds after the last of said one or more heated elongate elements is withdrawn from the male and female mold members.

5. A method of producing a silicone hydrogel contact lens mold assembly according to any previous claim wherein said first time period continues for from 3 to 7 seconds, for example from 5 to 7 seconds, after the last of said one or more heated elongate elements is withdrawn from the male and female mold members.

6. A method of producing a silicone hydrogel contact lens mold assembly according to any previous claim, wherein the female and male mold members are pressed together by applying a force in the range of from 50 N to 80 N, for example from 55 N to 75 N, throughout said first time period.

7. A method of producing a silicone hydrogel contact lens mold assembly according to any previous claim, wherein said step of placing one of a male mold member and a female mold member on the other of a male mold member and a female mold member comprises dropping one mold member onto the other mold member, and optionally wherein the male mold member is dropped onto the female mold member.

8. A method of producing a silicone hydrogel contact lens mold assembly according to claim 7, wherein the mold member is dropped from a height of from 0.5 mm to 5 mm, for example from 1 mm to 3 mm, for example from 1 mm to 2.3 mm, for example from 1 mm.

9. A method of producing a silicone hydrogel contact lens mold assembly according to any previous claim, wherein a second time period of at least 3 seconds, for example at least 5 seconds, elapses between placing the male mold member on the female mold member and the male and female mold members being pressed together.

10. A method of producing a silicone hydrogel contact lens mold assembly according to any previous claim, wherein the male mold member and female mold member form an interference fit when pressed together.

11. A method of producing a silicone hydrogel contact lens mold assembly according to any previous claim, wherein the lens shaped cavity defined between the male mold member and the female mold member has a thickness of at least 10 μm when measured at a distance of 50 μm from the peripheral edge of the cavity.

12. A method of producing a silicone hydrogel contact lens mold assembly according to any previous claim, wherein the heated elements pass through the male and female mold members.

13. A method of producing a silicone hydrogel contact lens mold assembly according to any previous claim, wherein the volume of lens precursor composition in the cavity is from 40μl to 60μl, for example from 45μl to 55μl, for example 50 μl.

14. A method of making a silicone hydrogel contact lens member, comprising:

forming a silicone hydrogel contact lens mold assembly according to the method of any previous claim; and optionally,

exposing the mold assembly to radiation to polymerize the polymerizable silicone hydrogel contact lens precursor composition to produce a contact lens body;

separating the male mold member from the female mold member, leaving the contact lens body in contact with the male and/or female mold member;

removing the contact lens body from said male and/or female mold member; and/or

extracting extractable materials from the contact lens body and/or hydrating the contact lens body to form a silicon hydrogel contact lens member.

15. A system for the production of a silicone hydrogel contact lens mold assembly, the mold assembly comprising a contact lens shaped cavity defined between a male mold member and a female mold member, the system comprising:

a clamp arranged to compress the mold assembly;

one or more heatable elongate elements, said heatable elongate elements being mounted for movement relative to the clamp to pass a tip of each heatable elongate element through the male and female mold members while they are being compressed by the clamp, and

a control system configured to control operation of the clamp and heatable elongate elements such that throughout a first time period beginning when the first of said one or more heatable elongate elements is inserted into the male and female mold members and continuing until at least 3 seconds after the last of said one or more heatable elongate elements are withdrawn from the male and female mold members, the clamp exerts a force in the range of from 20 N to 100 N on the male and female mold members.

16. A system according to claim 15, further comprising a support configured to retain a first mold member in a substantially fixed location, said first mold member being one of the male mold member and the female mold member, and a second mold member being the other of the male mold member and female mold member; and

the clamp comprises a clamp foot arranged to compress the first and second mold members between the clamp foot and the support when the first mold member is retained in the support and the second mold member is placed on the first mold member to define the lens shaped cavity therebetween; and the

control system is configured to control operation of the clamp such that throughout the first time period the clamp foot exerts a force in the range of from 20 N to 100 N on the second mold member.

17. A system according to claim 15 or claim 16, comprising one or more sensors configured to detect the position of the heatable elongate elements and/or one or more sensors configured to determine the force exerted on the male and female mold members by the clamp, and wherein the control system is configured to control operation of the clamp and/or heatable elongate elements in dependence on a signal received from said one or more sensors.

18. A system according to claim 16 or claim 17, further comprising a second support retaining one of the male or female mold member in a substantially fixed location; a pick up head having the other of the male and female mold member retained on an end thereof, and wherein the control system is configured to control the position of the pick-up head to position its mold member above the other mold member and to release its member from a height of from 1 mm to 3 mm.