CLAIMS

1. A contact lens comprising:

a hydrogel skirt, wherein the hydrogel skirt is molded into a shape of the contact lens, with an arcuate back surface placed proximate to a user's cornea during a use of the contact lens;

an insert, wherein the insert is gas impermeable and impermeable to fluid flow through its body, wherein the insert is encapsulated within the hydrogel skirt,

the encapsulated insertcomprising a dual chamber structure with spacers that determine the height of each chamber in the dual chamber structure, the spacers being 100 microns or less; and wherein the insert comprises one or more components mounted thereupon;

a first region of the hydrogel skirt, wherein the first region of the hydrogel skirt is that portion of the hydrogel skirt that is between a surface of the insert and a cornea of a user during the use of the contact lens; and

a means within the contact lens of enhancing oxygen levels within a fluid in contact with the first region comprising a first laser cut pore in the insert traversing at least one of the spacers, the first laser cut pore having a diameter of between 10 and 20 microns and positioned to be in a fluid contact with the first region.

2. The contact lens according to Claim 1, wherein the laser cut pore is back-filled with a silicone containing material.

3. The contact lens according to Claim 1, wherein the first laser cut pore is one of a plurality of laser cut pores, wherein the plurality of laser cut pores traverse the body of the insert.

4. The contact lens according to Claim 3, wherein the plurality of laser cut pores are back-filled with the silicone containing material.

5. The contact lens according to Claim 1, wherein the means within the contact lens of enhancing oxygen levels comprises a layer of absorptive material, wherein the absorptive material absorbs oxygen gas.

6. The contact lens according to Claim 7, wherein the absorptive material comprises hemoglobin.

7. The contact lens according to Claim 7, wherein the absorptive material comprises hemocyanin.

8. The contact lens according to Claim 7, wherein the absorptive material comprises a porphyrin based material.

9. The contact lens according to Claim 7, wherein the absorptive material comprises a metal organic framework molecular species.

10. The contact lens according to Claim 1, wherein the means within the contact lens of enhancing oxygen levels comprises an embedded electroactive releasing structure, wherein oxygen stored in a vessel is released upon an electrical signal.

11. The contact lens according to Claim 12, wherein the electrical signal causes an electrical current to melt a cover of a metallic foil.

12. The contact lens according to Claim 1, wherein the means within the contact lens of enhancing oxygen levels comprises an electroactive oxygen generator.

13. The contact lens according to Claim 14, wherein an electrical signal causes the electroactive oxygen generator to release a fluid comprising an oxygen containing chemical to interact with a catalytic surface to evolve oxygen gas.

14. The contact lens according to Claim 15, wherein the electroactive oxygen generator comprises hydrogen peroxide.

15. The contact lens according to Claim 16, wherein the electrical signal causes an electrical current to melt a metallic foil layer.

16. The contact lens according to Claim 1, wherein the means within the contact lens of enhancing oxygen levels comprises a pump, wherein the pump causes a movement of tear fluid proximate to the first region of the hydrogel skirt.

17. The contact lens according to Claim 18, wherein the tear fluid moves in channels formed within the hydrogel skirt.

18. The contact lens according to Claim 19, wherein the channels are shaped to favor a first direction of flow through the channels.

19. The contact lens according to Claim 20, wherein the pump comprises an electroactive element.

20. The contact lens according to Claim 21, wherein the electroactive element comprises one or more of a piezoelectric based transducer or an electroactive polymer based transducer.

21. The contact lens according to Claim 20, wherein the pump comprises a raised portion of hydrogel skirt material that interacts with a user's eyelid for engagement of a pumping action.

22. The contact lens according to Claim 18, wherein the pump comprises a raised portion of hydrogel skirt material that interacts with a user's eyelid for engagement of a pumping action.

23. A method of enhancing oxygen levels at a user's cornea when the user wears a contact lens, the method comprising:

forming a pore through a contact lens insert;

backfilling the pore with a silicone containing polymer; and

providing the contact lens comprising the contact lens insert, wherein during the use of the contact lens, oxygen diffuses through the pore with the silicone containing polymer to a region of tear fluid underneath the contact lens.

24. A method of enhancing oxygen levels at a user's cornea when the user wears a contact lens, the method comprising:

forming a layer of oxygen absorptive material within a body of the contact lens;

placing the contact lens in an ambient with high partial pressure of oxygen;

and

providing the contact lens, wherein during a use of the contact lens, oxygen diffuses from the absorptive material to a region of tear fluid underneath the contact lens.

25. A method of enhancing oxygen levels at a user's cornea when the user wears a contact lens, the method comprising:

forming a plurality of electroactive oxygen containing structures within a body of the contact lens; and

providing the contact lens, wherein during the use of the contact lens a programming of electrical signals provides electrical signals to a first electroactive oxygen containing structure, wherein the electrical signal to the first electroactive oxygen containing structures causes oxygen to diffuse from the electroactive oxygen containing structure to a region of tear fluid underneath the contact lens.

26. A method of enhancing oxygen levels at a user's cornea when the user wears a contact lens, the method comprising:

forming a plurality of channels in an arcuate back curved region of a hydrogel skirt of the contact lens;

forming a raised region of hydrogel skirt above a first enlarged channel in the arcuate back curved region of the hydrogel skirt of the contact lens; and

providing the contact lens, wherein during the use of the contact lens an eyelid of the user forces the raised region of hydrogel skirt to compress the first enlarged channel in the arcuate back curved region of the hydrogel skirt, wherein the compression causes tear fluid to move underneath the contact lens, wherein the contact lens comprises an insert comprising one or more components mounted within the insert.

27. A method of enhancing oxygen levels at a user's cornea when the user wears a contact lens, the method comprising:

forming an electroactive pump comprising a layer of piezoceramic material fixedly attached to a lens insert of the contact lens;

forming a plurality of channels in an arcuate back curved region of a hydrogel skirt of the contact lens;

forming a first enlarged channel in the arcuate back curved region of the hydrogel skirt of the contact lens, wherein the enlarged channel lies proximate to the electroactive pump; and

providing the contact lens, wherein during the use of the contact lens a programming of electrical signals provides electrical signals to the electroactive pump, wherein the electrical signal to electroactive pump forces the electroactive pump to compress the first enlarged channel in the arcuate back curved region of the hydrogel skirt, wherein the compression causes tear fluid to move underneath the contact lens.