CLAIMS

1. An active lens insert for an ophthalmic lens comprising:

annular shaped full ring substrate layers with one or both of electrical and logical functionality; wherein the size, shape and stacking structure of each of the annular shaped substrate layers is based on the thickness around an optical zone of the ophthalmic lens;

electrical interconnections between substrate layers; and

the active lens insert encapsulated with one or more materials for bonding within the body material of a molded ophthalmic lens.

2. The active lens insert of Claim 1, wherein the substrate functional layers are adhered to insulating layers forming a stacked feature.

3. The active lens insert of Claim 1 or 2, wherein the annular shaped full ring substrate layers are cut from a wafer.

4. The active lens insert of Claim 1, 2 or 3, wherein the size, shape and stacking structure of each of the annular shaped substrate layers is further based on the base curve of an ophthalmic lens.

5. The active lens insert of any preceding claim, wherein the size, shape and stacking structure of each of the annular shaped substrate layers is further based on the diameter of an ophthalmic lens.

6. The active lens insert of any preceding claim, wherein the size, shape and stacking structure of each of the annular shaped substrate layers is further based on encapsulation parameters of the active lens insert.

7. The active lens insert of any preceding claim, further comprising an encapsulating biocompatible polymer.

8. The active lens insert of Claim 7, wherein the biocompatible polymer for encapsulation is a polysilicone based polymer.

9. The active lens insert of any preceding claim, wherein the encapsulation of the active lens insert maintains a minimum thickness between an edge of a substrate layer and an outer edge of a lens of less than about 150 μm thickness.

10. The active lens insert of any preceding claim, wherein the active lens insert comprises three or more annular shaped substrate layers.

11. The active lens insert of any preceding claim, wherein the active lens insert comprises a full ring annular shape.

12. The active lens insert of any preceding claim, wherein one or more of the substrate layers of the active lens insert comprises one or more individually functionalized layer.

13. The active lens insert of Claim 12, wherein one or more of the individually functionalized layers comprises a metallic layer which functions as an antenna.

14. The active lens insert of Claim 10, wherein one or more of the substrate layers of the active lens insert comprises an energization source.

15. The active lens insert of Claim 10 or 14, wherein one or more of the substrate layers of the active lens insert comprises a power regulation source.

16. The active lens insert of Claim 15, wherein the power regulation source comprises at least one semiconductor layer with electronic microcircuitry capable to control electric current flow from the electrochemical cells.

17. The active lens insert of Claim 16, wherein the electronic microcircuitry is electrically connected to an electroactive lens component within the ophthalmic lens.

18. The active lens insert of Claim 15, 16 or 17, wherein the power regulation source of one or more substrate layers are capable of receiving power from external sources.

19. The active lens insert of any one of Claims 15 to 18, wherein the power regulation source of one or more substrate layers are capable of charging the battery layer.

20. The active lens insert of any one of Claims 15 to 19, wherein the power regulation source of one or more substrate layers are capable of controlling the use of power when the ophthalmic lens is not in a charging environment.

21. The active lens insert of any one of Claims 15 to 20, wherein the power regulation source of one or more substrate layers are capable of controlling the use of power when the ophthalmic lens is in a charging environment.

22. The active lens insert of any of Claims 10 to 21, wherein one or more of the substrate layers of the active lens insert comprises a solid state energy source.

23. The active lens insert of any preceding claim, wherein one or more of the substrate layers comprises microcircuitry to detect actuation signals for the active lens insert.

24. A method of forming an active lens insert for an ophthalmic lens, the method comprising:

forming annular shaped full ring substrate layers with one or both of electrical and logical functionality; wherein the size, shape and stacking structure of each of the annular shaped substrate layers is based on the thickness around an optical zone of the ophthalmic lens;

forming electrical interconnections between substrate layers; and

encapsulating the active lens insert with one or more materials for bonding within the body material of a molded ophthalmic lens.

The invention claim is:

1. An active lens insert for an ophthalmic lens comprising:

a stacked composite structure comprising: annular shaped full ring substrate layers with one or both of electrical and logical functionality; and

electrical interconnections between the annular shaped full ring substrate layers to create the active lens insert;

wherein each of the annular shaped full ring substrate layers have a different radius and encircle an optical zone of the ophthalmic lens; and

wherein a size and a stacking structure of the annular shaped full ring substrate layers are selected to allow encapsulation of the active lens insert in a region around an optical zone of the ophthalmic lens.

2. The active lens insert of claim **1**, wherein the annular shaped full ring substrate layers are adhered to insulating layers forming the stacked composite structure.

3. The active lens insert of claim **1**, wherein the annular shaped full ring substrate layers are cut from a wafer.

4. The active lens insert of claim **1**, wherein the size and the stacking structure for the annular shaped full ring substrate layers is further based on a base curve of the ophthalmic lens.

5. The active lens insert of claim **1**, wherein the size and the stacking structure for the annular shaped full ring substrate layers is further based on a diameter of the ophthalmic lens.

6. The active lens insert of claim **1**, wherein the size and the stacking structure for the annular shaped full ring substrate layers is further based on encapsulation parameters of the ophthalmic lens.

7. The active lens insert of claim **1**, wherein the active lens insert comprises at least three annular shaped full ring substrate layers.

8. The active lens insert of claim **1**, wherein the active lens insert comprises a full ring annular shape.

9. The active lens insert of claim **7**, wherein at least one of the annular shaped full ring substrate layers comprises a metallic layer configured to act as an antenna.

10. The active lens insert of claim **7**, wherein at least one of the annular shaped full ring substrate layers of the active lens insert comprises an energization source.

11. The active lens insert of claim **7**, wherein at least one of the annular shaped full ring substrate layers of the active lens insert comprises a power regulation source.

12. The active lens insert of claim **11**, wherein the power regulation source comprises at least one semiconductor layer with electronic microcircuitry capable to control electric current flow from electrochemical cells.

13. The active lens insert of claim **12**, wherein the electronic microcircuitry is electrically connected to an electroactive lens component within the ophthalmic lens.

14. The active lens insert of claim **12**, wherein the power regulation source is capable of receiving power from external sources.

15. The active lens insert of claim **12**, wherein the power regulation source is capable of charging a battery layer.

16. The active lens insert of claim **12**, wherein the power regulation source is capable of controlling the use of power when the ophthalmic lens is not in a charging environment.

17. The active lens insert of claim **12**, wherein the power regulation source is capable of controlling the use of power when the ophthalmic lens is in a charging environment.

18. The active lens insert of claim **12**, wherein at least one of the annular shaped full ring substrate layers of the active lens insert comprises a solid state energy source.

19. The active lens insert of claim **1**, wherein at least one of the annular shaped full ring substrate layers comprises microcircuitry to detect actuation signals for the active lens insert.