

CLAIMS

1. An Energized Ophthalmic Lens device with a Variable Optic Insert comprising:
- 5 an Ophthalmic Lens Insert-encapsulating layer comprising an Optical Zone and a non-optical zone;
- a Variable Optic Insert comprising at least a portion within the Optical Zone;
- an Energy Source embedded in the Insert-encapsulating material in at least a region comprising the non-optical zone;
- 10 the Variable Optic Insert comprising a layer of Liquid Crystal material; and
- at least a first layer of dielectric material proximate to the layer of Liquid Crystal material.
2. The Energized Ophthalmic Lens device of Claim 1 wherein:
- 15 the Lens is a Contact Lens.
3. The Energized Ophthalmic Lens device of Claim 2 wherein:
- the first layer of dielectric material varies in thickness across a region within the Optical Zone resulting in a varying electric field across the layer of
- 20 Liquid Crystal material.
4. The Energized Ophthalmic Lens device of Claim 3 wherein:
- the Variable Optic Insert alters a focal characteristic of the Lens.
- 25 5. The Ophthalmic Lens device of claim 3 wherein:
- the first layer of dielectric material is a composite of two materials with similar optical characteristics and dissimilar low frequency dielectric characteristics.

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6. The Energized Ophthalmic Lens device of claim 2 wherein:
the Energy Source energizes components within the Lens and causes the
Liquid Crystal to alter its polarizing effect on light.
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7. The Energized Ophthalmic Lens device of claim 3 wherein:
the Liquid Crystal layer is between at least two Alignment Layers;
the at least two Alignment Layers are between two electrode layers; and
the two electrode layers are in Electrical Communication with the Energy
Source.
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8. The Ophthalmic Lens device of claim 7 wherein:
the Liquid Crystal has at least a first Energized Orientation; and
an energization of the electrode layers causes the Liquid Crystal to shift
from a Resting Orientation to at least a first Energized Orientation.
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9. An Energized Intraocular Lens with a Variable Optic portion comprising:
an Intraocular Lens with an Optical Zone and a first non-optical zone;
an Energy Source attached to an Intraocular Lens in the first non-optical
zone;
a Variable Optic comprising at least a first layer of Liquid Crystal material;
and
at least a first layer of dielectric material proximate to the layer of Liquid
Crystal material.
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10. The Energized Intraocular Lens of claim 9 wherein:
the first layer of dielectric material is a composite of at least a first material
and a second material with similar optical characteristics and dissimilar low
frequency dielectric characteristics.
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11. The Energized Intraocular Lens of claim 10 wherein:
the first material of the first layer of dielectric material is shaped to have a
different thickness across the Optical Zone.
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12. The Energized Intraocular Lens of claim 10 wherein:
the Variable Optic Insert alters a focal characteristic of the lens.
13. The Energized Intraocular Lens of claim 12 wherein:
the Energy Source energizes components within the Lens and causes the
Liquid Crystal to alter its refractive effect on light.
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14. The Energized Intraocular Lens of claim 13 wherein:
at least a first Liquid Crystal layer is between at least two electrode layers;
and
the electrode layers are in Electrical Communication with the Energy
Source.
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15. The Energized Intraocular Lens of claim 14 wherein:
at least a first Liquid Crystal layer has at least a first Energized Orientation;
and
an energization of the electrode layers causes the Liquid Crystal to shift
from a Resting Orientation to at least the first Energized Orientation.
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16. The Energized Ophthalmic Lens device of claim 1 wherein:
the Ophthalmic Lens Insert-encapsulating layer comprises a silicone-
containing material.
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17. The Energized Ophthalmic Lens device of claim 1 wherein:
the Ophthalmic Lens Insert-encapsulating layer comprises Etafilcon A.
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18. The Energized Ophthalmic Lens device of claim 1 additionally comprising:
a processor.
19. The Energized Ophthalmic Lens device of claim 7 additionally comprising:
a processor.
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20. The Energized Intraocular Lens device of claim 14 additionally comprising:
a processor.

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The invention claimed is:

1. An energized ophthalmic lens device with a variable optic insert comprising:

an ophthalmic lens insert-encapsulating layer comprising an optical zone and a non-optical zone;

a variable optic insert comprising at least a portion within the optical zone;

an energy source embedded in the ophthalmic lens insert-encapsulating layer in at least a region comprising the non-optical zone;

the variable optic insert comprising a layer of liquid crystal material; and

at least a first layer of dielectric material proximate to the layer of liquid crystal material,

wherein the first layer of dielectric material varies in thickness across a region within the optical zone.

2. The energized ophthalmic lens device of claim 1 wherein:

the energized ophthalmic lens is a contact lens.

3. The energized ophthalmic lens device of claim 2 wherein:

a varying electric field across the layer of liquid crystal material results from at least the first layer of dielectric material varying in thickness across the region within the optical zone.

4. The energized ophthalmic lens device of claim 3 wherein:

the variable optic insert alters a focal characteristic of the energized ophthalmic lens.

5. The energized ophthalmic lens device of claim 3 wherein:

the first layer of dielectric material is a composite of two materials with similar optical characteristics and dissimilar low frequency dielectric characteristics.

6. The energized ophthalmic lens device of claim 2 wherein:

the energy source energizes components within the energized ophthalmic lens and causes the layer of liquid crystal material to alter its polarizing effect on light.

7. The energized ophthalmic lens device of claim 3 wherein:

- the layer of liquid crystal material is between at least two alignment layers;
- the at least two alignment layers are between at least two electrode layers;
- and the at least two electrode layers are in electrical communication with the energy source.

8. The energized ophthalmic lens device of claim 7 wherein:

- the layer of liquid crystal material has at least a first energized orientation; and
- an energization of the at least two electrode layers causes the layer of liquid crystal material to shift from a resting orientation to at least the first energization orientation.

9. The energized ophthalmic lens device of claim 1 wherein:

- the ophthalmic lens insert-encapsulating layer comprises a silicone-containing material.

10. The energized ophthalmic lens device of claim 1 wherein:

- the ophthalmic lens insert-encapsulating layer comprises Etafilcon A.

11. The energized ophthalmic lens device of claim 1 additionally comprising:

- a processor.

12. The energized ophthalmic lens device of claim 7 additionally comprising:

- a processor.

13. The energized ophthalmic lens device of claim 7 wherein:

- the energy source comprises a scale of energy levels;
- the layer of liquid crystal material comprises a plurality of energization orientations, wherein each of the plurality of energization orientations relates to a different one of the scale of energy levels; and
- an energization of the at least two electrode layers at a particular one of the scale of energy levels causes the layer of liquid crystal material to shift from a resting orientation to the related one of the plurality of energization orientations.

14. An energized intraocular lens with a variable optic insert comprising:
an intraocular lens with an optical zone and a first non-optical zone;
an energy source attached to the intraocular lens in the first non-optical zone;
a variable optic insert comprising at least a first layer of liquid crystal material; and
at least a first layer of dielectric material proximate to the layer of liquid crystal material,
wherein the first layer of dielectric material is shaped to have a different thickness across the optical zone.
15. The energized intraocular lens of claim 14 wherein:
the first layer of dielectric material is a composite of at least a first material and a second material with similar optical characteristics and dissimilar low frequency dielectric characteristics.
16. The energized intraocular lens of claim 15 wherein:
the variable optic insert alters a focal characteristic of the intraocular lens.
17. The energized intraocular lens of claim 16 wherein:
the energy source energizes components within the intraocular lens and causes the layer of liquid crystal material to alter its refractive effect on light.
18. The energized intraocular lens of claim 17 wherein:
at least the first layer of liquid crystal material is between at least two electrode layers; and
the at least two electrode layers are in electrical communication with the energy source.
19. The energized intraocular lens of claim 18 wherein:
at least the first layer of liquid crystal material has at least a first energized orientation; and
an energization of the at least two electrode layers causes the layer of liquid crystal material to shift from a resting orientation to at least the first energized orientation.
20. The energized intraocular lens device of claim 18 additionally comprising:
a processor.

21. The energized intraocular lens device of claim 18 wherein:

- the energy source comprises a scale of energy levels;
- the layer of liquid crystal material comprises a plurality of energization orientations, wherein each of the plurality of energization orientations relates to a different one of the scale of energy levels; and
- an energization of the at least two electrode layers at a particular one of the scale of energy levels causes the layer of liquid crystal material to shift from a resting orientation to the related one of the plurality of energization orientations.