CLAIMS

1. A variable focus ophthalmic device comprising:

a front curve optical portion of the variable focus ophthalmic device comprising a front curve top optical surface and a front curve bottom optical surface;

a back curve optical portion of the variable focus ophthalmic device comprising a back curve top optical surface and a back curve bottom optical surface;

a cavity formed by the front curve bottom optical surface of the front curve optical portion of the variable focus ophthalmic device and the back curve top optical surface of the back curve portion of the variable focus ophthalmic device;

a first fluid with a first index of refraction and a second fluid with a second index of refraction, wherein the first index of refraction and the second index of refraction are different and the two fluids are immiscible;

a dielectric film in contact with at least a portion of one or more of the first or second fluids and overlying an electrode capable of establishing an electric field; and

one or more reservoir regions for containment of a volume of fluid equal or approximately equal to the volume of the first fluid and wherein the reservoir is in fluid connection with said formed cavity.

2. The variable focus ophthalmic device of Claim 1, additionally comprising an energy source in electrical communication with said electrode, wherein said energy source may provide an electric current capable of establishing the electric field.

3. The variable focus ophthalmic device of Claim 1, wherein the dielectric film overlays more than one electrode.

4. The variable focus ophthalmic device of Claim 1, wherein the fluid connection between the reservoir and the formed cavity is via one or more channels that allow for the flow of the first and second fluids.

5. The variable focus ophthalmic device of Claim 4, additionally comprising a fluid control device to control the flow of one or both the first and second fluids.

6. The variable focus ophthalmic device of Claim 5, wherein the fluid control device comprises one or more check valves.

7. The variable focus ophthalmic device of Claim 5, wherein the fluid control device comprises one or more microelectromechanical valves.

8. The variable focus ophthalmic device of Claim 1, wherein the volume of the reservoir and the volume of the formed cavity is generally equal.

9. The variable focus ophthalmic device of Claim 1, wherein the electrode and dielectric film are located on at least a portion of one or both of; the surfaces forming the cavity and the reservoir.

10. The variable focus ophthalmic device of Claim 4, wherein the dielectric film is located on at least a portion of one or more of the one or more channels between the cavity and the reservoir, the surfaces forming the cavity and the reservoir.

11. The variable focus ophthalmic device of Claim 1, wherein one or both the first or second fluids additionally comprise a light absorbing dye component.

12. The variable focus ophthalmic device of Claim 1, wherein one or both the first or second fluid additionally comprise a light shading dye component.

13. The variable focus ophthalmic device of Claim 1, wherein one or both the first or second fluid additionally comprise a component with enantiomeric characteristics.

14. The variable focus ophthalmic device of Claim 1, additionally comprising an encapsulating ophthalmic lens.

15. The variable focus ophthalmic device of Claim 14, wherein the encapsulating ophthalmic lens is made up of a biocompatible hydrogel.

16. The variable focus ophthalmic device of Claim 1, wherein the bottom optical surface of the back curve element is positioned on the front curve portion of an ophthalmic lens.

17. The variable focus ophthalmic device of Claim 1, wherein the top optical surface of the back curve element is positioned on the back curve portion of an ophthalmic lens.

18. The variable focus ophthalmic device of Claim 4, wherein one or more of the reservoir, the cavity formed or the channels can be formed by a generally deformable material that varies its shape under the influence of an electric current.

19. The variable focus ophthalmic device of Claim 4, wherein one or more of the reservoir, the cavity formed or the channels can be formed by a generally deformable material that varies its shape under the influence of an electric field.

20. The variable focus ophthalmic device of Claim 18, wherein at least a portion of said deformable material capable of varying its shape under the influence of an electric current comprises an electroactive polymer material.

The invention claimed is:

1. A variable focus ophthalmic device comprising:

a front curve optical portion comprising a front curve top optical surface and a front curve bottom optical surface;

a back curve optical portion comprising a back curve top optical surface and a back curve bottom optical surface;

a cavity formed by the front curve bottom optical surface of the front curve optical portion and the back curve top optical surface of the back curve optical portion;

a first liquid with a first index of refraction and a second liquid with a second index of refraction, wherein the first index of refraction is different than the second index of refraction and the first liquid and the second liquid are immiscible;

one or more electrodes configured to establish an electric field;

a dielectric film in contact with at least a portion of one or more of the first liquid and the second liquid and overlying at least one of the electrodes;

at least one reservoir for containing a volume of the first liquid or the second liquid in fluid connection with said cavity; and

one or more channels between the reservoir and the cavity;

wherein the cavity and reservoir are configured such that when the first liquid occupies the cavity, the second liquid is excluded from the cavity.

2. The variable focus ophthalmic device of claim 1, additionally comprising an energy source in electrical communication with said electrode.

3. The variable focus ophthalmic device of claim 1, wherein the dielectric film overlays at least two of the electrodes.

4. The variable focus ophthalmic device of claim 1, additionally comprising a fluid control device to control the flow of one or both of the first liquid and second liquid.

5. The variable focus ophthalmic device of claim 4, wherein the fluid control device comprises one or more check valves.

6. The variable focus ophthalmic device of claim 4, wherein the fluid control device comprises one or more microelectromechanical valves.

7. The variable focus ophthalmic device of claim 1, wherein the reservoir and the cavity are of generally equal volume.

8. The variable focus ophthalmic device of claim 1, wherein the electrode and the dielectric film are located on at least a portion of one or both of the cavity and the reservoir.

9. The variable focus ophthalmic device of claim 1, wherein the dielectric film is located on at least a portion of one or more of the channels, the cavity and the reservoir.

10. The variable focus ophthalmic device of claim 1, wherein at least one of the first liquid and the second liquid comprises a light absorbing dye component.

11. The variable focus ophthalmic device of claim 1, wherein at least one of the first liquid and the second liquid comprises a light shading dye component.

12. The variable focus ophthalmic device of claim 1, wherein at least one of the first liquid and second liquid comprises a component with enantiomeric characteristics.

13. The variable focus ophthalmic device of claim 1, additionally comprising an encapsulating ophthalmic lens.

14. The variable focus ophthalmic device of claim 13, wherein the encapsulating ophthalmic lens is made up of a biocompatible hydrogel.

15. The variable focus ophthalmic device of claim 1, wherein one or more of the reservoir, the cavity and the channels comprise a generally deformable material that varies its shape under the influence of an electric current.

16. The variable focus ophthalmic device of claim 15, wherein at least a portion of said deformable material comprises an electroactive polymer material.

17. The variable focus ophthalmic device of claim 1, wherein one or more of the reservoir, the cavity and the channels comprise a generally deformable material that varies its shape under the influence of the electric field.

18. The variable focus ophthalmic device of claim 1, additionally comprising an ophthalmic lens.

19. The variable focus ophthalmic device of claim 18, wherein the back curve bottom optical surface is positioned on the front surface of the ophthalmic lens.

20. The variable focus ophthalmic device of claim 18, wherein the front curve top optical surface is positioned on the back surface of the ophthalmic lens.

21. The variable focus ophthalmic device of claim 1, further comprising a first reservoir for containing a volume of the first liquid in fluid connection with said cavity and a second reservoir for containing a volume of the second liquid in fluid connection with said cavity.