CLAIMS

1. An optical lens comprising:

a front curve lens comprising a front curve lens exterior surface and a front curve lens interior surface, wherein both said front curve lens exterior surface and said front curve lens interior surface comprise an arcuate shape;

a back curve lens comprising a back curve lens interior surface and a back curve lens exterior surface, wherein both said back curve lens interior surface and the back curve lens exterior surface comprise an arcuate shape, said back curve lens positioned proximate to said front curve lens such that said front curve lens interior surface and said back curve lens interior surface form a cavity therebetween;

a volume of saline solution and oil contained within the cavity formed between said front curve lens interior surface and said back curve lens interior surface, said volume of saline solution and oil comprising a meniscus therebetween; and

a meniscus wall comprising a first segment including a shape generally of a conical frustum in mechanical communication with a second segment including a torus, wherein the torus is generally convex to an optical axis formed through the front curve lens and back curve lens and bordering the meniscus.

2. The optical lens of claim 1 additionally comprising a conductive coating on at least a portion of said meniscus wall.

3. The optical lens of claim 2 wherein the volume of oil is less than the volume of saline solution contained within the cavity.

4. The optical lens of claim 3 wherein the volume of oil comprises about 66% or more by volume as compared to an amount of saline solution.

5. The optical lens of claim 3 wherein the volume of oil comprises about 90% or less by volume as compared to an amount of saline solution.

6. The optical lens of claim 2 wherein the volume of oil comprises a density about equal to a density of the saline solution.

7. The optical lens of claim 2 wherein the volume of oil comprises density within about 10% of a density of the saline solution.

8. The optical lens of claim 2 wherein the volume of oil comprises density within about 5% of a density of the saline solution.

9. The optical lens of claim 2 wherein the conductive coating extends from an area interior to the cavity to an area external to the cavity.

10. The optical lens of claim 9, wherein the area of conductive coating external to the cavity forms an electrical terminal for providing an electrical charge to the liquid meniscus lens.

11. The optical lens of claim 9 wherein the saline solution and the oil form a meniscus and an application of an electrical charge to the area of conductive coating external to the cavity causes a change in position of contact of the meniscus along the meniscus wall.

12. The optical lens of claim 9 wherein the electrical charge comprises a direct current.

13. The optical lens of claim 9 wherein the electrical charge comprises about 20.0 volts.

14. The optical lens of claim 9 wherein the electrical charge comprises between about 18.0 volts to 22.0 volts.

15. The optical lens of claim 9 wherein the electrical charge comprises about 5.0 volts.

16. The optical lens of claim 9 wherein the electrical charge comprises between about 3.5 volts to about 7.5 volts.

17. The optical lens of claim 3 wherein the front curve lens exterior surface comprises an optical power other than about 0.

18. The optical lens of claim 3 wherein the front curve lens interior surface comprises an optical power other than about 0.

19. The optical lens of claim 3 wherein the back curve lens exterior surface comprises an optical power other than about 0.

20. The optical lens of claim 3 wherein the back curve lens interior surface comprises an optical power other than about 0.

21. The optical lens of claim 3 additionally comprising a channel through one or both of the front curve lens and the back curve lens and a conductive material filling the channel.

22. The optical lens of claim 21 additionally comprising a terminal in electrical communication with the conductive material filling the channel.

23. The optical lens of claim 22 wherein application of an electrical charge to the terminal causes a change in the shape of the meniscus.

24. The optical lens of claim 3 additionally comprising an insulator coating along at least a portion of the interior surface of the front curve lens, wherein the insulator coating comprises an electrical insulator.

25. The optical lens of claim 24, wherein the insulator comprises one of Parylene C and Teflon AF.

26. The optical lens of claim 24 wherein the insulator comprises a boundary area to maintain separation between the conductive coating and a saline solution contained in the cavity between the front curve lens and the back curve lens.

27. The optical lens of claim 3 wherein an angle of the conical frustum segment comprising the meniscus wall comprises between about 30° and 50°.

28. The optical lens of claim 27 additionally comprising a meniscus sharp adjacent to the meniscus wall, said sharp comprising a angular feature for containing the volume of saline solution and oil.

29. The optical lens of claim 27 wherein the sharp comprises a radial surface portion.

30. The optical lens of claim 28 wherein the radial surface portion comprises a radius in the range of 5 microns to 25 microns.

The invention claimed is:

1. An optical lens comprising:

a front curve lens comprising a front curve lens exterior surface and a front curve lens interior surface, wherein both said front curve lens exterior surface and said front curve lens interior surface comprise an arcuate shape;

a back curve lens comprising a back curve lens interior surface and a back curve lens exterior surface, wherein both said back curve lens interior surface and the back curve lens exterior surface comprise an arcuate shape, said back curve lens positioned proximate to said front curve lens such that said front curve lens interior surface and said back curve lens interior surface form a cavity therebetween;

a volume of saline solution and oil contained within the cavity formed between said front curve lens interior surface and said back curve lens interior surface, said volume of saline solution and oil comprising a meniscus therebetween; and

a meniscus wall comprising a first segment including a shape generally of a conical frustum in mechanical communication with a second segment including a torus, wherein the torus is generally convex to an optical axis formed through the front curve lens and back curve lens and bordering the meniscus; and

additionally comprising a channel through one or both of the front curve lens and the back curve lens and a conductive material filling the channel.

2. The optical lens of claim 1 additionally comprising a conductive coating on at least a portion of said meniscus wall.

3. The optical lens of claim 2 wherein the volume of oil is less than the volume of saline solution contained within the cavity.

4. The optical lens of claim 3 wherein the volume of oil comprises about 66% or more of the volume of saline solution.

5. The optical lens of claim 1 additionally comprising a terminal in electrical communication with the conductive material filling the channel.

6. The optical lens of claim 5 wherein application of an electrical charge to the terminal causes a change in the shape of the meniscus.

7. The optical lens of claim **2** wherein the volume of oil comprises a density about equal to a density of the saline solution.

8. The optical lens of claim **2** wherein the volume of oil comprises density within about 10% of a density of the saline solution.

9. The optical lens of claim **2** wherein the volume of oil comprises density within about 5% of a density of the saline solution.

10. The optical lens of claim **2** wherein the conductive coating extends from an area interior to the cavity to an area external to the cavity.

11. The optical lens of claim **10**, wherein the area of conductive coating external to the cavity forms an electrical terminal for providing an electrical charge to the liquid meniscus lens.

12. The optical lens of claim **10** wherein the saline solution and the oil form a meniscus and an application of an electrical charge to the area of conductive coating external to the cavity causes a change in position of contact of the meniscus along the meniscus wall.

13. The optical lens of claim **10** wherein the electrical charge comprises a direct current.

14. The optical lens of claim **10** wherein the electrical charge comprises about 20.0 volts.

15. The optical lens of claim **10** wherein the electrical charge comprises between about 18.0 volts to 22.0 volts.

16. The optical lens of claim **10** wherein the electrical charge comprises about 5.0 volts.

17. The optical lens of claim **10** wherein the electrical charge comprises between about 3.5 volts to about 7.5 volts.

18. The optical lens of claim **3** wherein the volume of oil comprises about 90% or less of the volume of saline solution.

19. The optical lens of claim **3** wherein the front curve lens exterior surface comprises an optical power other than about 0.

20. The optical lens of claim **3** wherein the front curve lens interior surface comprises an optical power other than about 0.

21. The optical lens of claim **3** wherein the back curve lens exterior surface comprises an optical power other than about 0.

22. The optical lens of claim 3 wherein the back curve lens interior surface comprises an optical power other than about 0.

23. The optical lens of claim 3 additionally comprising an insulator coating along at least a portion of the interior surface of the front curve lens, wherein the insulator coating comprises an electrical insulator.

24. The optical lens of claim 23, wherein the insulator comprises one of Parylene C and Teflon AF.

25. The optical lens of claim 23 wherein the insulator comprises a boundary area to maintain separation between the conductive coating and a saline solution contained in the cavity between the front curve lens and the back curve lens.

26. The optical lens of claim 3 wherein an angle of the conical frustum segment comprising the meniscus wall comprises between about 30.degree. and 50.degree.

27. The optical lens of claim 26 additionally comprising a meniscus sharp adjacent to the meniscus wall, said sharp comprising an angular feature for containing the volume of saline solution and oil.

28. The optical lens of claim 27 wherein the meniscus sharp comprises a radial surface portion.

29. The optical lens of claim 28 wherein the radial surface portion comprises a radius in the range of 5 microns to 25 microns.

30. An optical lens comprising:

a front curve lens comprising a front curve lens exterior surface and a front curve lens interior surface, wherein both said front curve lens exterior surface and said front curve lens interior surface comprise an arcuate shape;

a back curve lens comprising a back curve lens interior surface and a back curve lens exterior surface, wherein both said back curve lens interior surface and the back curve lens exterior surface comprise an arcuate shape, said back curve lens positioned proximate to said front curve lens such that said front curve lens interior surface and said back curve lens interior surface form a cavity therebetween;

a volume of saline solution and oil contained within the cavity formed between said front curve lens interior surface and said back curve lens interior surface, said volume of saline solution and oil comprising a meniscus therebetween; and

a meniscus wall comprising a first segment including a shape generally of a conical frustum in mechanical communication with a second segment including a torus, wherein the torus is generally convex to an optical axis formed through the front curve lens and back curve lens and bordering the meniscus; and

additionally comprising a meniscus sharp adjacent to the meniscus wall, said sharp comprising an angular feature for containing the volume of saline solution and oil.

31. The optical lens of claim **30** additionally comprising a conductive coating on at least a portion of said meniscus wall.

32. The optical lens of claim **31** wherein the volume of oil is less than the volume of saline solution contained within the cavity.

33. The optical lens of claim **32** wherein the volume of oil comprises about 66% or more of the volume of saline solution.

34. The optical lens of claim **30** wherein the meniscus sharp comprises a radial surface portion.

35. The optical lens of claim **34** wherein the radial surface portion comprises a radius in the range of 5 microns to 25 microns.

36. The optical lens of claim **31** wherein the volume of oil comprises a density about equal to a density of the saline solution.

37. The optical lens of claim **31** wherein the volume of oil comprises density within about 10% of a density of the saline solution.

38. The optical lens of claim **31** wherein the volume of oil comprises density within about 5% of a density of the saline solution.

39. The optical lens of claim **31** wherein the conductive coating extends from an area interior to the cavity to an area external to the cavity.

40. The optical lens of claim **39**, wherein the area of conductive coating external to the cavity forms an electrical terminal for providing an electrical charge to the liquid meniscus lens.

41. The optical lens of claim **39** wherein the saline solution and the oil form a meniscus, and an application of an electrical charge to the area of conductive coating external to the cavity causes a change in position of contact of the meniscus along the meniscus wall.

42. The optical lens of claim **39** wherein the electrical charge comprises a direct current.

43. The optical lens of claim **39** wherein the electrical charge comprises about 20.0 volts.

44. The optical lens of claim **39** wherein the electrical charge comprises between about 18.0 volts to 22.0 volts.

45. The optical lens of claim **39** wherein the electrical charge comprises about 5.0 volts.

46. The optical lens of claim **39** wherein the electrical charge comprises between about 3.5 volts to about 7.5 volts.

47. The optical lens of claim **32** wherein the volume of oil comprises about 90% or less of the volume of saline solution.

48. The optical lens of claim **32** wherein the front curve lens exterior surface comprises an optical power other than about 0.

49. The optical lens of claim **32** wherein the front curve lens interior surface comprises an optical power other than about 0.

50. The optical lens of claim **32** wherein the back curve lens exterior surface comprises an optical power other than about 0.

51. The optical lens of claim **32** wherein the back curve lens interior surface comprises an optical power other than about 0.

52. The optical lens of claim **32** wherein the back curve lens interior surface comprises an optical power other than about 0.

53. The optical lens of claim **52** additionally comprising a terminal in electrical communication with the conductive material filling the channel.

54. The optical lens of claim **53** wherein application of an electrical charge to the terminal causes a change in the shape of the meniscus.

55. The optical lens of claim **32** additionally comprising an insulator coating along at least a portion of the interior surface of the front curve lens, wherein the insulator coating comprises an electrical insulator.

56. The optical lens of claim **55**, wherein the insulator comprises one of Parylene C and Teflon AF.

57. The optical lens of claim **55** wherein the insulator comprises a boundary area to maintain separation between the conductive coating and a saline solution contained in the cavity between the front curve lens and the back curve lens.

58. The optical lens of claim **32** wherein an angle of the conical frustum segment comprising the meniscus wall comprises between about 30° and 50°.