CLAIMS

1. An optical lens apparatus with an optical quality based upon a liquid meniscus, the optical lens apparatus comprising:

a front curve lens with a front curve lens exterior surface and a front curve lens interior surface;

a back curve lens with a back curve lens interior surface and a back curve lens exterior surface, wherein said back curve lens is 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 with an optical axis through the front curve lens and the back curve lens, wherein at least one of said front curve lens and back curve lens comprises a meniscus wall about an interior circumference, and the cavity contains:

a volume of saline solution and a volume of optical quality oil in contact with the meniscus wall, and wherein the saline solution comprises one or more zwitterions;

a liquid meniscus formed by said volume of saline solution and said volume of optical quality oil, wherein the liquid meniscus intersects the optical axis path formed through the front curve lens and the back curve lens.

2. The optical lens apparatus of claim 1 wherein the saline solution further comprises one or more sterically bulky neutralizing agents.

3. The optical lens apparatus of claim 1 or claim 2, wherein the saline solution further comprises one or more cosolvents.

4. The optical lens apparatus of any of the preceding claims wherein the saline solution further comprises one or more ionic surfactants.

5. The optical lens apparatus of any of the preceding claims wherein the saline solution further comprises one or more non-ionic surfactants.

6. The optical lens apparatus of any of the preceding claims wherein the saline solution further comprises a light-absorbing compound.

7. The optical lens apparatus of any of the preceding claims wherein the saline solution further comprises a kinematic viscosity of less than about 10 cSt.

8. The optical lens apparatus of any of the preceding claims wherein the saline solution is free of particulate contaminants having a median particle diameter of about 0.5 microns or greater.

9. The optical lens apparatus of any of the preceding claims wherein the saline solution comprises a specific gravity that is substantially equivalent to that of the oil component.

10. The optical lens apparatus of any of the preceding claims wherein an absolute value of a difference of specific gravities between the saline solution and the oil component is greater than about 0.010.

11. The optical lens apparatus of any of the preceding claims wherein both said front curve lens exterior surface and said front curve lens interior surface shape comprise an arcuate shape.

12. The optical lens apparatus of any of the preceding claims, wherein both said back curve lens interior surface and the back curve lens exterior surface shape includes an arcuate shape.

13. The optical lens apparatus of any of the preceding claims, additionally comprising a conductive coating on at least a portion of said meniscus wall.

14. The optical lens apparatus of claim 13 wherein the conductive coating extends from an area interior to the cavity to an area external to the cavity.

15. The optical lens apparatus of claim 14, wherein the area of conductive coating external to the cavity forms an electrical terminal capable of providing an electrical charge to the liquid meniscus lens.

16. The optical lens apparatus of any of the preceding claims wherein the volume of oil is less than the volume of saline solution contained within the cavity.

17. The optical lens apparatus of claim 16 wherein the volume of oil contained within the cavity occupies from 60% to 90% of the cavity.

18. The optical lens apparatus of any of the preceding claims wherein the volume of the oil has a density within 12% of the density of the saline solution.

19. The optical lens apparatus of any of the preceding claims 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.

20. The optical lens apparatus of claim 19 wherein the electrical charge comprises a direct current.

21. The optical lens apparatus of claim 19 or claim 20 wherein the electrical charge comprises between about 18.0 volts to 22.0 volts.

22. The optical lens apparatus of any of the preceding claims wherein the front curve lens exterior surface comprises an optical power other than about 0.

23. The optical lens apparatus of any of the preceding claims wherein the front curve lens interior surface comprises an optical power other than about 0.

24. The optical lens apparatus of any of the preceding claims wherein the back curve lens interior surface comprises an optical power other than about 0.

The invention claimed is:

1. An optical lens apparatus with an optical quality based upon a liquid meniscus, the optical lens apparatus comprising:

a front curve lens with a front curve lens exterior surface and a front curve lens interior surface;

a back curve lens with a back curve lens interior surface and a back curve lens exterior surface, wherein said back curve lens is 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 with an optical axis through the front curve lens and the back curve lens, wherein at least one of said front curve lens and back curve lens comprises a meniscus wall about an interior circumference, and the cavity contains:

a volume of saline solution and a volume of oil in contact with the meniscus wall, wherein the saline solution comprises one or more zwitterions and one or more sterically bulky neutralizing agents to minimize charge trapping; and

a liquid meniscus formed by said volume of saline solution and said volume of oil, wherein the liquid meniscus intersects the optical axis formed through the front curve lens and the back curve lens.

2. The optical lens apparatus of claim **1** wherein the pH of the saline solution is approximately equal to the pKa of the zwitterion.

3. The optical lens apparatus of claim **1** wherein the saline solution further comprises one or more cosolvents.

4. The optical lens apparatus of claim **1** wherein the saline solution further comprises one or more ionic surfactants.

5. The optical lens apparatus of claim **1** wherein the saline solution further comprises one or more non-ionic surfactants.

6. The optical lens apparatus of claim **1** wherein the saline solution further comprises a light-absorbing compound.

7. The optical lens apparatus of claim **1** wherein the saline solution further comprises a kinematic viscosity of less than about 10 cSt.

8. The optical lens apparatus of claim **1** wherein the saline solution is free of particulate contaminants having a median particle diameter of about 0.5 microns or greater.

9. The optical lens apparatus of claim 1 wherein the saline solution comprises a specific gravity that is substantially equivalent to that of the oil component.

10. The optical lens of claim 1 wherein an absolute value of a difference of specific gravities between the saline solution and the oil component is greater than about 0.010.

11. The optical lens apparatus of claim 1 wherein both said front curve lens exterior surface and said front curve lens interior surface shape comprise an arcuate shape.

12. The optical lens apparatus of claim 1 wherein both said back curve lens interior surface and the back curve lens exterior surface shape includes an arcuate shape.

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

14. The optical lens of claim 13 wherein the conductive coating extends from an area interior to the cavity to an area external to the cavity.

15. The optical lens of claim 14 wherein the area of conductive coating external to the cavity forms an electrical terminal capable of providing an electrical charge to the liquid meniscus lens.

16. The optical lens of claim 14 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.

17. The optical lens of claim 16 wherein the electrical charge comprises a direct current.

18. The optical lens of claim 16 wherein the electrical charge comprises between about 18.0 volts to 22.0 volts.

19. The optical lens of claim 1 wherein the volume of oil is less than the volume of saline solution contained within the cavity.

20. The optical lens of claim 1 wherein the volume of oil contained within the cavity occupies from 60% to 90% of the cavity.

21. The optical lens of claim 1 wherein the volume of the oil has a density within 12% of the density of the saline solution.

22. The optical lens of claim 1 wherein the front curve lens exterior surface comprises an optical power other than about 0 diopters.

23. The optical lens of claim **1** wherein the front curve lens interior surface comprises an optical power other than about 0 diopters.

24. The optical lens of claim **1** wherein the back curve lens interior surface comprises an optical power other than about 0 diopters.

25. The optical lens of claim **1** additionally comprising a liquid meniscus boundary formed by said volume of saline solution and said volume of oil, wherein the liquid meniscus boundary is adapted for movement along the meniscus wall in response to an electrical charge.

26. The optical lens of claim **1** additionally comprising a conductive coating extending from an area internal to the cavity containing the saline solution and the oil to an area external to the cavity containing the saline solution and the oil.

27. The optical lens of claim **26** wherein the conductive coating comprises a conduit of an electrical charge applied at a point external to the cavity to an area of the conductive coating within the cavity and in contact with the saline solution.

28. The optical lens of claim **27** additionally comprising a power source applying a bias to the conductive coating and an opposite bias to the volume of saline solution.

29. The optical lens of claim **1** wherein the meniscus wall has a first and a second angular break, and the meniscus wall is angled relative to the optical axis.