CLAIMS

1. A microcannula for access and advancement into a tissue space of an eye, comprising:

a flexible elongated element with a proximal end, a distal tip and a communicating channel therebetween, and having an outer diameter no more than 350 microns,

wherein said communicating channel is an optical fiber to transport light energy,

wherein said proximal end is adapted to connect to a light source to provide a visual light source at the distal tip,

wherein said distal tip is rounded, and

wherein, when light is delivered to the rounded distal tip, the rounded distal tip acts to disperse the light for improved off-axis visualization.

2. The microcannula of claim 1, wherein the flexible elongated element has a flexural rigidity less than 7.5E-10 $kN*m^2$.

3. The microcannula of claim 1, wherein the flexible elongated element has a flexural rigidity less than 2.86E-10 $kN*m^2$.

4. The microcannula of claim 1, further comprising a lubricious outer coating.

5. The microcannula of claim 1, further comprising a lubricant on an outer surface of the flexible elongated element.

6. The microcannula of claim 1, wherein the flexible elongated element is contained within a polymer tube.

7. The microcannula of claim 1, wherein said distal tip is rounded into a shaped that approximates a portion of a sphere.

8. The microcannula of claim 1, wherein said distal tip is rounded into an approximately spherical shape.

9. The microcannula of claim 1, wherein the rounded distal tip is configured as a ball-end distal tip.

10. The microcannula of claim 1, wherein said flexible elongated element has an outer diameter no more than 250 microns.

11. The microcannula of claim 1, further comprising a light source connected to a proximal end of the optical fiber.

12. The microcannula of claim 1, wherein said light source comprises a laser, a laser diode, a light-emitting diode, an incandescent light, or a mercury halogen lamp.

13. A microcannula for access and advancement into a tissue space of an eye, comprising:

a flexible, tubular communicating element configured to fit within the tissue space and having a proximal end and a distal end;

a proximal connector attached to said proximal end, said proximal connector configured for introduction of materials, energy or tools;

wherein an outer diameter of said microcannula is no more than 350 microns;

wherein the distal end has a rounded distal tip; and

an optical fiber capable of delivering light to the rounded tip and wherein, when light is delivered to said rounded tip, said rounded tip acts to disperse the light for improved off-axis visualization.

14. The microcannula of claim 13, wherein the microcannula has a proximal portion and a distal portion, and wherein the proximal portion has a flexural rigidity greater than a flexural rigidity of the distal portion.

15. The microcannula of claim 13, wherein the microcannula has a flexural rigidity of approximately 3.09 E-11 $kN*m^2$ on a distal portion of the microcannula positioned adjacent to the distal end.

16. The microcannula of claim 13, wherein the microcannula has a flexural rigidity of approximately 3.76 E-11 kN*m^2 on a distal portion of the microcannula positioned adjacent to the distal end.

17. The microcannula of claim 13, wherein the microcannula has a flexural rigidity of approximately 6.33 E-11 kN*m^2 on a distal portion of the microcannula positioned adjacent to the distal end.

18. The microcannula of claim 13, wherein the microcannula has a flexural rigidity of approximately 9.69 E-11 kN*m^2 on a distal portion of the microcannula positioned adjacent to the distal end.

19. The microcannula of claim 13, wherein the microcannula has a flexural rigidity of approximately 2.86 E-10 kN*m^2 on a microcannula positioned adjacent to the distal end.

20. The microcannula of claim 13, wherein the microcannula has a flexural rigidity of 3.09 E-11 to 9.69 E-11 kN*m^2 on a distal portion of the microcannula positioned adjacent to the distal end.

21. The microcannula of claim 13, wherein the microcannula has a flexural rigidity of 3.09 E-11 to 6.33 E-11 kN*m^2 on a distal portion of the microcannula positioned adjacent to the distal end.

22. The microcannula of claim 13, wherein the microcannula has a flexural rigidity of 3.09 E-11 to 3.76 E-11 kN*m^2 on a distal portion of the microcannula positioned adjacent to the distal end.

23. The microcannula of claim 13, wherein the microcannula has a flexural rigidity of 3.76 E-11 kN*m^2 to 9.69 E-11 kN*m^2 on a distal portion of the microcannula positioned adjacent to the distal end.

24. The microcannula of claim 13, wherein the rounded distal tip of the microcannula is approximately spherical.

25. The microcannula of claim 13, wherein the microcannula has a flexural rigidity in the range of 3.09 E-11 to 2.86 E-10 kN*m^2 on a distal portion of the microcannula positioned adjacent to the distal end.

26. The microcannula of claim 13, further comprising a reinforcing member connected with the flexible, tubular communicating element.

27. The microcannula of claim 26, wherein the reinforcing element comprises a malleable reinforcing member to allow manual shaping of the microcannula.

28. The microcannula of claim 26, wherein the reinforcing element comprises a metal.

29. The microcannula of claim 26, wherein the tubular communicating element comprises a flexible polymer and the reinforcing member comprises a metal.

30. The microcannula of claim 26, wherein the reinforcing element comprises a coil.

31. The microcannula of claim 26, wherein the reinforcing element is tapered toward the distal end of the microcannula.

32. The microcannula of claim 26, wherein the tubular communicating element and the reinforcing element are joined by an outer sheath.

33. The microcannula of claim 32, wherein the outer sheath comprises heat shrink tubing.

34. The microcannula of claim 26, wherein the tubular communicating element and the reinforcing element are joined with an adhesive.

35. The microcannula of claim 13, wherein the microcannula is configured to fit within a tissue space selected from the group consisting of Schlemm's Canal, an aqueous collector channel, an aqueous vein, a suprachoroidal space and a retinal blood vessel of the eye.

36. A microcannula for access and advancement into a tissue space of an eye, comprising:

a flexible elongated element with a proximal end, a distal tip and a communicating channel therebetween, and having an outer diameter no more than 350 microns,

wherein said communicating channel is an optical fiber to transport light energy,

wherein said proximal end is adapted to connect to a light source to provide a visual light source at the distal tip, and

wherein said distal tip is rounded;

characterized in that the microcannula has a flexural rigidity in the range of 3.09 E-11 to 2.86E-10kN*m^2.

37. The microcannula of claim 36 wherein, when light is delivered to said rounded tip, said rounded tip acts to disperse the light for improved off-axis visualization.

38. The microcannula of claim 36, further comprising a lubricious outer coating.

39. The microcannula of claim 36, wherein the flexible elongated element is contained within a polymer tube.

What is claimed is:

1. A composite microcannula for access and advancement into a tissue space of the eye comprising:

at least one flexible, tubular communicating element configured to fit within the tissue space and having an outer diameter of no more than 350 microns, the communicating element having a proximal end and a distal end;

a proximal connector attached to said proximal end, said proximal connector configured for introduction of materials, energy or tools;

and a reinforcing member connected with the communicating element.

2. The microcannula of claim 1, wherein the composite microcannula has a flexural rigidity in the range of 3.09 E-11 to 2.86 E-10 $kN*m^2$.

3. The microcannula of claim 1, wherein the reinforcing member provides greater axial and flexural stiffness at the proximal end of the microcannula as compared to the distal end of the microcannula.

4. The microcannula of claim 1, wherein the reinforcing element is malleable to allow manual shaping of the microcannula.

5. The microcannula of claim 1, wherein the reinforcing element comprises a metal.

6. The microcannula of claim 1, wherein the communicating element comprises a flexible polymer and the reinforcing member comprises a metal.

7. The microcannula of claim 1, wherein the microcannula comprises a signal beacon capable of identifying a position of the distal tip.

8. The microcannula of claim 1, wherein the microcannula further comprises at least one additional communicating element.

9. The microcannula of claim 8, wherein one of the communicating elements provides a signal beacon at the microcannula distal tip.

10. The microcannula of claim 8, wherein the additional communicating element is located within the lumen of the first communicating element.

11. The microcannula of claim 10, wherein the communicating elements are in concentric alignment.

12. The microcannula of claim 8, wherein the communicating elements are in parallel alignment

13. The microcannula of claim 1, wherein the microcannula comprises two or more reinforcing elements.

14. The microcannula of claim 1, wherein the reinforcing element comprises a coil.

15. The microcannula of claim 1, wherein the reinforcing element is tapered toward the distal end of the microcannula.

16. The microcannula of claim 1, wherein the communicating element includes a segment chosen from the group consisting of a segment of tubing, a segment of optical fiber and a segment of an electrical conductor.

17. The microcannula of claim 1, wherein the microcannula is configured to fit within a tissue space selected from the group consisting of Schlemm's Canal, an aqueous collector channel, an aqueous vein, a suprachoroidal space and a retinal blood vessel of the eye.

18. The microcannula of claim 1, wherein the distal end has a rounded distal tip.

19. The microcannula of claim 18, wherein the communicating element comprises an optical fiber capable of delivering light to the rounded tip and wherein, when light is delivered to said rounded tip, said rounded tip acts to disperse the light for improved off-axis visualization.

20. The microcannula of claim 1, wherein the communicating element and the reinforcing element are joined by an outer sheath.

21. The microcannula of claim 20, wherein the outer sheath comprises heat shrink tubing.

22. The microcannula of claim 1, wherein the communicating element and the reinforcing element are joined with an adhesive.

23. The microcannula of claim 1, additionally comprising a lubricious outer coating.

24. A composite microcannula for access and advancement into a tissue space of the eye comprising:

at least one flexible, tubular communicating element with an outer diameter of no more than 350 microns, said communicating element having a proximal end, a distal end, and a fluid communicating lumen,

a proximal connector configured for delivery of fluid,

a signal beacon,

and a second communicating element configured to deliver the signal beacon, the signal beacon being capable of identifying the microcannula distal tip.

25. The composite microcannula of claim 24, wherein the second communicating element comprises an optical fiber and the signal beacon delivers visible light.

26. The microcannula of claim 24, wherein the composite microcannula has a flexural rigidity in the range of 3.09 E-11 to 2.86 E-10 $kN*m^2$.

27. The composite microcannula of claim 24, additionally comprising a rounded distal tip.

28. The composite microcannula of claim 27, wherein the rounded distal tip acts to disperse the signal beacon for improved off-axis visualization.

29. A system for performing ophthalmic surgery, the system comprising:

a composite microcannula for access and advancement into a tissue space of an eye, the microcannula including:

at least one flexible, tubular communicating element configured to fit within the tissue space and having an outer diameter of no more than 350 microns, the communicating element having a proximal end and a distal end;

a proximal connector attached to said proximal end, said proximal connector configured for introduction of materials, energy or tools;

and a distal opening;

and a lubricating fluid,

wherein said distal opening is located to allow delivery of said lubricating fluid into the tissue space around said distal end.

30. The system of claim 29, further comprising a second communicating element.

31. The system of claim 30, wherein the second communicating element has a signal beacon capable of identifying a position of a distal tip of the microcannula.

32. The microcannula of claim 30, wherein where the second communicating element is located within the lumen of the first communicating element.

33. The microcannula of claim 30, wherein the communicating elements are in concentric alignment.

34. The microcannula of claim 30, wherein the communicating elements are in parallel alignment

35. The microcannula of claim 29, wherein the composite microcannula has a flexural rigidity in the range of 3.09 E-11 to 2.86 E-10 $kN*m^2$.

36. The microcannula of claim 29, wherein the composite microcannula provides greater axial and flexural stiffness at the proximal end of the microcannula as compared to the distal end of the microcannula.

37. The system of claim 29, wherein the microcannula includes a reinforcing member connected with the communicating element.

38. The microcannula of claim 37, where the reinforcing element is malleable to allow manual shaping of the microcannula.

39. The microcannula of claim 37, wherein the reinforcing element comprises a metal.

40. The microcannula of claim 37, wherein the reinforcing element comprises a coil.

41. The microcannula of claim 37, wherein the reinforcing element is tapered toward the distal end of the microcannula.

42. The microcannula of claim 37, wherein the communicating element and the reinforcing element are joined by an outer sheath.

43. The microcannula of claim 42, wherein the outer sheath comprises heat shrink tubing.

44. The microcannula of claim 37, wherein the communicating element and the reinforcing element are joined with an adhesive.

45. The microcannula of claim 29, wherein the communicating element comprises a flexible polymer.

46. The microcannula of claim 29, wherein the microcannula comprises two or more reinforcing elements.

47. The microcannula of claim 29, wherein the communicating element includes a segment chosen from the group consisting of a segment of tubing, a segment of optical fiber and a segment of an electrical conductor.

48. The microcannula of claim 29, wherein the microcannula is configured to fit within a tissue space is selected from the group consisting of Schlemm's Canal, an aqueous collector channel, an aqueous vein, a suprachoroidal space and a retinal blood vessel of the eye.

49. The microcannula of claim 29, wherein the distal end has a rounded distal tip.

50. The microcannula of claim 49, wherein the communicating element comprises an optical fiber capable of delivering light to the rounded tip and wherein, when light is delivered to said rounded tip, said rounded tip acts to disperse the light for improved off-axis visualization.

51. The microcannula of claim 29 additionally comprising a lubricious outer coating.

52. The microcannula of claim 29, wherein the lubricating fluid is a viscoelastic fluid.

53. A method of performing ophthalmic surgery, the method comprising the steps of:
(a) forming an incision in an eye to access a tissue space within the eye;
(b) placing a tip of a microcannula into the tissue space;
(c) advancing to the microcannula along the tissue space;
(d) while delivering a lubricating fluid into the tissue space distal to the tip of the microcannula;

54. The method of claim 53, wherein the fluid delivered in step (d) is a viscoelastic fluid.

55. The method of claim 53, further comprising the steps of:
(e) activating a signal beacon capable of identifying a location of a distal tip of the microcannula;
(f) identifying the location of the distal tip of the microcannula by locating the source of the signal beacon.