CLAIMS

What is claimed is:

1. A heterofunctional surgical filament comprising a plurality of sections wherein: at least one section has features different from the features of at least one other section, and said at least one section has at least one demarcation which allows features associated with said at least one section to be distinguished from features associated with said at least one other section, wherein said features are features other than the presence, absence or orientation of retainers.

2. The heterofunctional surgical filament of claim 1, wherein the heterofunctional surgical filament is a self-retaining suture.

3. The heterofunctional surgical filament of claim 1, wherein the demarcation comprises a visible marker.

4. The heterofunctional surgical filament of claim 1, wherein the demarcation comprises a tactile marker.

5. The heterofunctional surgical filament of claim 3, wherein the marker is visible in the optical spectrum.

6. The heterofunctional surgical filament of claim 3, wherein the marker is visible in a fluorescence spectrum.

7. The heterofunctional surgical filament of claim 3, wherein the marker is detectable by radio detection.

8. The heterofunctional surgical filament of claim 3, wherein the marker is detectable by magnetic imaging.

9. The heterofunctional surgical filament of claim 3, wherein the marker comprises a colourant.

10. The heterofunctional surgical filament of claim 3, wherein the marker comprises a mechanical tab.

11. The heterofunctional surgical filament of claim 9, wherein the colourant comprises a fluorescent colourant.

12. The heterofunctional surgical filament of claim 4, wherein the marker comprises a deformation.

13. The heterofunctional surgical filament of claim 4, wherein the marker comprises an indentation.

14. The heterofunctional surgical filament of claim 4, wherein the marker comprises a relief configuration.

15. The heterofunctional surgical filament of claim 1, wherein the filament comprises a biodegradable material.

16. The heterofunctional surgical filament of claim 1, wherein the filament comprises a coating.

17. The heterofunctional surgical filament of claim 16, wherein the coating comprises at least one composition selected from the class consisting of anti-proliferative agents, anti-angiogenic agents, anti-infective agents, fibrosis-inducing agents, anti-scarring agents, lubricious agents, echogenic agents, anti-inflammatory agents, cell cycle inhibitors, analgesics, and anti-microtubule agents.

18. The heterofunctional surgical filament of claim 1, wherein one section comprises a pledget.

19. The heterofunctional surgical filament of claim 1, further comprising a needle.

20. The heterofunctional surgical filament of claim 19, wherein the needle comprises an active marker system.

21. The heterofunctional surgical filament of claim 20, wherein the active marker system comprises a power source, a light controller, and a light source.

22. The heterofunctional surgical filament of claim 1, wherein the demarcation indicates an identifying feature of the filament.

23. The heterofunctional surgical filament of claim 1, wherein the demarcation indicates an identifying feature of the section.

24. The heterofunctional surgical filament of claim 1, wherein the demarcation indicates force acting on the filament.

25. The heterofunctional surgical filament of claim 24, wherein the force is a mechanical force.

26. The heterofunctional surgical filament of claim 1, wherein the demarcation indicates a condition of the filament.

27. The heterofunctional surgical filament of claim 26, wherein the demarcation indicates mechanical strain.

28. The heterofunctional surgical filament of claim 26, wherein the demarcation indicates chemical degradation.

29. The heterofunctional surgical filament of claim 1, comprising a passive variable marker system.

30. The heterofunctional surgical filament of claim 29, wherein the passive variable marker system indicates a change in filament condition.

31. The heterofunctional surgical filament of claim 30, wherein the change comprises mechanical strain.

32. The heterofunctional surgical filament of claim 30, wherein the change comprises chemical degradation.

33. The heterofunctional surgical filament of claim 29, wherein the passive variable marker system comprises a sensor.

34. The heterofunctional surgical filament of claim 1, wherein the filament comprises a dental suture.

35. The heterofunctional surgical filament of claim 1, wherein the filament comprises a microsuture.

36. The heterofunctional surgical filament of claim 1, wherein the filament comprises an ophthalmic suture or a tissue repositioning suture.

37. A heterofunctional surgical suture comprising a filament and a plurality of sections wherein: at least one section has features different from the features of at least one other section, and said at least one section has at least one demarcation which allows features associated with said at least one section to be distinguished from features associated with said at least one other section, wherein said features are features other than the presence, absence or orientation of retainers.

38. The heterofunctional surgical suture of claim 37, wherein the heterofunctional surgical suture is a self-retaining suture.

39. The heterofunctional surgical suture of claim 37, wherein the demarcation comprises a visible marker.

40. The heterofunctional surgical suture of claim 37, wherein the demarcation comprises a tactile marker.

41. The heterofunctional surgical suture of claim 39, wherein the marker is visible in the optical spectrum.

42. The heterofunctional surgical suture of claim 39, wherein the marker is visible in a fluorescence spectrum.

43. The heterofunctional surgical suture of claim 39, wherein the marker is detectable by radio detection.

44. The heterofunctional surgical suture of claim 39, wherein the marker is detectable by magnetic imaging.

45. The heterofunctional surgical suture of claim 39, wherein the marker comprises a colourant.

46. The heterofunctional surgical suture of claim 45, wherein the colourant comprises a fluorescent colourant.

47. The heterofunctional surgical suture of claim 39, wherein the marker comprises a mechanical tab.

48. The heterofunctional surgical suture of claim 40, wherein the marker comprises a deformation.

49. The heterofunctional surgical suture of claim 40, wherein the marker comprises an indentation.

50. The heterofunctional surgical suture of claim 40, wherein the marker comprises a relief configuration.

51. The heterofunctional surgical suture of claim 37, wherein the filament comprises a biodegradable material.

52. The heterofunctional surgical suture of claim 37, wherein the filament comprises a coating.

53. The heterofunctional surgical suture of claim 52, wherein the coating comprises at least one composition selected from the class consisting of anti-proliferative agents, anti-angiogenic agents, anti-infective agents, fibrosis-inducing agents, anti-scarring agents, lubricious agents, echogenic agents, anti-inflammatory agents, cell cycle inhibitors, analgesics, and anti-microtubule agents.

54. The heterofunctional surgical suture of claim 37, wherein one section comprises a pledget.

55. The heterofunctional surgical suture of claim 37, wherein one section comprises a needle.

56. The heterofunctional surgical suture of claim 55, the needle comprises an active marker system.

57. The heterofunctional surgical filament of claim 56, wherein the active marker system comprises a power source, a light controller, and a light source.

58. The heterofunctional surgical filament of claim 37, wherein the marker indicates an identifying feature of the filament.

59. The heterofunctional surgical filament of claim 37, wherein the marker indicates an identifying feature of the section.

60. The heterofunctional surgical filament of claim 37, wherein the marker indicates force acting on the filament.

61. The heterofunctional surgical filament of claim 60, wherein the force is a mechanical force.

62. The heterofunctional surgical filament of claim 37, wherein the marker indicates a condition of the filament.

63. The heterofunctional surgical filament of claim 62, wherein the marker indicates mechanical strain.

64. The heterofunctional surgical filament of claim 62, wherein the marker indicates chemical degradation.

65. The heterofunctional surgical filament of claim 37, comprising a passive variable marker system.

66. The heterofunctional surgical filament of claim 65, wherein the passive variable marker system indicates a change in filament condition.

67. The heterofunctional surgical filament of claim 30, wherein the change comprises mechanical strain.

68. The heterofunctional surgical filament of claim 30, wherein the change comprises chemical degradation.

69. The heterofunctional surgical filament of claim 29, wherein the passive variable marker system comprises a sensor.

70. The heterofunctional surgical filament of claim 37, wherein the filament comprises a dental suture.

71. The heterofunctional surgical filament of claim 37, wherein the filament comprises a microsuture.

72. The heterofunctional surgical filament of claim 37, wherein the filament comprises an ophthalmic suture.

73. The heterofunctional surgical filament of claim 37, wherein the filament comprises a tissue repositioning suture.

74. A method of forming a marked bidirectional self-retaining suture, said method comprising: (i) providing a bidirectional self-retaining suture having a plurality of sections, a first section comprising a first plurality of retainers at or near a first end of the suture, a second section comprising a second plurality of retainers at or near a second end of the suture, and a third section comprising a transitional segment between the first and second pluralities of retainers; and (ii) marking at least one section of the suture to provide at least one demarcation which allows features associated with said at least one section to be distinguished from features associated with at least one other section, wherein said features are features other than the presence, absence or orientation of retainers.

75. The method of claim 74, wherein step (ii) comprises treating at least a portion of the at least one section with an agent selected from the class consisting of abrasives, polymerisers, and etchants.

76. The method of claim 74, wherein step (ii) comprises treating at least a portion of the at least one section with a chemical agent to change the colour of the transition section.

77. The method of claim 74, wherein step (ii) comprises treating at least a portion of the at least one section with energy to change the colour of the transition section.

78. The method of claim 77, wherein the energy comprises laser energy.

79. The method of claim 74, wherein step (ii) comprises treating at least a portion of the at least one section with an agent selected from the class consisting of optical spectrum colourants, ultraviolet spectrum colourants, fluorescent colourants, radio detectable compounds, and magnetic resonance imaging detectable compounds.

80. The method of claim 74, wherein step (ii) comprises imparting a deformation in the at least one section.

81. The method of claim 74, wherein step (ii) comprises forming an indentation in the surface of the at least one section.

82. The method of claim 74, wherein step (ii) comprises imparting a relief configuration in the surface of the at least one section.

83. The method of claim 74, wherein step (ii) comprises attaching one or more mechanical tabs to the at least one section.

84. The method of claim 74, further comprising coating the suture at least in part in at least one composition selected from the class consisting of anti-proliferative agents, anti-angiogenic agents, anti-infective agents, fibrosis-inducing agents, anti-scarring agents, lubricious agents, echogenic agents, anti-inflammatory agents, cell cycle inhibitors, analgesics, and anti- microtubule agents.

85. A method of forming a marked bidirectional self-retaining suture, said method comprising providing a suture; demarcating a transition segment on the suture; forming a plurality of retainers adjacent to a first end of the at least one section; and, forming a plurality of retainers adjacent to a second end of the at least one section, wherein said demarcating provides at least one demarcation

which allows features associated with said transition segment to be distinguished from features associated with at least one section, wherein said features are features other than the presence, absence or orientation of retainers.

86. The method of claim 85, wherein the first and second pluralities of retainers are formed concurrently.

87. The method of claim 85, wherein demarcating a transition segment comprises treating at least a portion of the at least one section with an agent selected from the class consisting of abrasives, polymerisers, and etchants.

88. The method of claim 85, wherein demarcating a transition segment comprises treating at least a portion of the at least one section with an agent selected from the class consisting of optical spectrum colourants, ultraviolet spectrum colourants, and fluorescent colourants.

89. The method of claim 85, wherein demarcating a transition segment comprises imparting a deformation in the surface of the at least one section.

90. The method of claim 85, wherein demarcating a transition segment comprises forming an indentation in the surface of the at least one section.

91. The method of claim 85, wherein demarcating a transition segment comprises imparting a relief configuration in the surface of the at least one section.

92. The method of claim 85, further comprising coating the suture at least in part in at least one composition selected from the class consisting of anti-proliferative agents, anti-angiogenic agents, anti-infective agents, fibrosis-inducing agents, anti-scarring agents, lubricious agents, echogenic agents, anti-inflammatory agents, cell cycle inhibitors, analgesics, and anti- microtubule agents.

93. A method of forming a coded heterofunctional surgical filament, said method comprising providing biocompatible surgical filament material, adding a marking agent to a portion of the surgical filament material, forming a suture having a plurality of sections wherein a first section has features different from the features of at least one other section and wherein at least the first section

comprises the marking agent; and, forming a plurality of retainers adjacent to a second end of the transition portion.

94. The method of claim 93, wherein the marking agent is selected from the class consisting of optical spectrum colourants, ultraviolet spectrum colourants, and fluorescent colourants.

95. The method of claim 93, further comprising coating the suture at least in part in at least one composition selected from the class consisting of anti-proliferative agents, anti-angiogenic agents, anti-infective agents, fibrosis-inducing agents, anti-scarring agents, lubricious agents, echogenic agents, anti-inflammatory agents, cell cycle inhibitors, analgesics, and anti- microtubule agents.

96. Use of a heterofunctional surgical filament as claimed in any of the preceding claims.

97. Use of a suture as claimed in any of the preceding claims.

CLAIMS

1. A heterofunctional surgical filament comprising a plurality of sections wherein: at least one section has features different from the features of at least one other section, and said at least one section has at least one demarcation which allows it to be distinguished from said at least one other section, wherein the demarcation comprises a marker detectable:

a) in the fluorescence spectrum; or
b) by radio detection; or
c) by magnetic imaging.

2. The filament of claim 1, wherein the marker comprises a fluorescent colourant, or a mechanical tab.

3. The filament of claim 1, wherein the filament comprises a coating selected from at least one composition of the class consisting of anti-proliferative agents, anti-angiogenic agents, anti-infective agents, fibrosis-inducing agents, anti-scarring agents, lubricious agents, echogenic agents, anti-inflammatory agents, cell cycle inhibitors, analgesics, and anti-microtubule agents.

4. The filament of claim 1, wherein the demarcation indicates force acting on the filament.

5. The filament of claim 4, wherein the force is a mechanical force.

6. The filament of claim 1, wherein the demarcation indicates a condition of the filament, mechanical strain or chemical degradation.

7. The filament of claim 1, comprising a passive variable marker system.

8. The filament of claim 7, wherein the passive variable marker system indicates a change in filament condition.

9. The filament of claim 8, wherein the change comprises mechanical strain or chemical degradation.

10. The filament of claim 7, wherein the passive variable marker system comprises a sensor.

11. A self-retaining suture including a heterofunctional surgical filament as claimed in any one of the preceding claims.

12. The suture of claim 11, wherein the suture comprises a dental suture, a micro-suture, an ophthalmic suture or a tissue repositioning suture.

13. The suture of claim 11, wherein a needle of the suture comprises an active marker system.

14. The suture of claim 13, wherein the active marker system comprises a power source, a light controller, and a light source.

15. A method of forming a marked bidirectional self-retaining suture, said method comprising: (i) providing a bidirectional self-retaining suture having a plurality of sections, a first section comprising a first plurality of retainers at or near a first end of the suture, a second section comprising a second plurality of retainers at or near a second end of the suture, and a third section comprising a transitional segment between the first and second pluralities of retainers; and (ii) marking at least one section of the suture to provide at least one demarcation which allows features associated with said at least one section to be distinguished from features associated with at least one other section, wherein step (ii) comprises treating at least a portion of the at least one section with:

a) an agent selected from the class consisting of abrasives, polymerisers, and etchants; or
b) a chemical agent to change the colour of the transition section; or
c) energy to change the colour of the transition section; or

d) an agent selected from the class consisting of ultraviolet spectrum colourants, fluorescent colourants, radio detectable compounds, and magnetic resonance imaging detectable compounds.

16. The method of claim 15, wherein the energy comprises laser energy.

17. The method of claim 15, wherein step (ii) comprises attaching one or more mechanical tabs to the at least one section.

18. The method of claim 15, further comprising coating the suture at least in part in at least one composition selected from the class consisting of anti-prolifer-ative agents, anti-angiogenic agents, anti-infective agents, fibrosis-inducing agents, anti-scarring agents, lubricious agents, echogenic agents, anti-inflammatory agents, cell cycle inhibitors, analgesics, and anti-microtubule agents.

19. A method of forming a coded heterofunctional surgical filament, said method comprising providing biocompatible surgical filament material, adding a marking agent to a portion of the surgical filament material, forming a suture having a plurality of sections wherein a first section has features different from the features of at least one other section and wherein at least the first section comprises the marking agent; and, forming a plurality of retainers adjacent to a second end of the transition portion.

20. The method of claim 19, wherein the marking agent is selected from the class consisting of ultraviolet spectrum colourants, and fluorescent colourants.

21. The method of claim 19, further comprising coating the suture at least in part in at least one composition selected from the class consisting of anti-proliferative agents, anti-angiogenic agents, anti-infective agents, fibrosis-inducing agents, anti-scarring agents, lubricious agents, echogenic agents, anti-inflam-matory agents, cell cycle inhibitors, analgesics, and anti-microtubule agents.