HALO-HYDROCARBON POLYMER COATING

TECHNICAL FIELD

This disclosure relates generally to polymer coatings and, more specifically, to a halo-hydrocarbon polymer coating for electrical devices.

BACKGROUND

Many electrical devices comprise electrical components that are soldered to printed circuit boards (PCBs). The metal surfaces on the electrical components and PCBs often oxidize or corrode before being soldered together. The oxidation or corrosion of the metal surfaces may prevent strong solder joints from being formed or may reduce the lifetime of such joints. As a result, the electrical devices may be defective or may not function as long as desired.

SUMMARY

In a first aspect of the present disclosure, there is provided a printed circuit board, comprising:

a substrate comprising an insulating material;

a plurality of conductive tracks attached to at least one surface of the substrate;

a coating deposited on the at least one surface of the substrate, wherein:

the coating covers at least a portion of the plurality of conductive tracks; and

comprises at least one halo-hydrocarbon polymer;

and

at least one conductive wire that is connected by a wire bond to at least one conductive track at a particular region of the substrate, the wire bond formed through the coating without prior removal of the coating such that the wire bond connects the at least one conductive wire directly to the at least one conductive track at the particular region and the coating abuts the wire bond at the particular region.

In a second aspect of the present disclosure, there is provided a method, comprising:

attaching a plurality of conductive tracks to at least one surface of a substrate comprising an insulating material;

depositing a coating on the at least one surface of the substrate, the coating covering at least a portion of the plurality of conductive tracks, the coating comprising at least one halo-hydrocarbon polymer; and

forming a wire bond between at least one conductive wire and at least one conductive track at a particular region of the substrate, the wire bond formed through the coating without prior removal of the coating such that the wire bond connects the at least one conductive wire directly to the at least one conductive track at the particular region and the coating abuts the wire bond at the particular region.

In some embodiments, a printed circuit board (PCB) comprises a substrate comprising an insulating material. The PCB further comprises a plurality of conductive tracks attached to at least one surface of the substrate. The PCB further comprises a coating deposited on the at least one surface of the substrate. The coating may cover at least a portion of the plurality of conductive tracks and may comprise at least one halo-hydrocarbon polymer. The PCB may further comprise at least one conductive wire that is connected by a wire bond to at least one conductive track, wherein the wire bond is formed through the coating without prior removal of the coating such that the wire bond abuts the coating.

In other embodiments, a PCB comprises a substrate comprising an insulating material. The PCB further comprises a plurality of conductive tracks attached to at least one surface of the substrate. The PCB further comprises a multi-layer coating deposited on the at least one surface of the substrate. The multi-layer coating (i) covers at least a portion of the plurality of conductive tracks and (ii) comprises at least one layer formed of a halo-hydrocarbon polymer. The PCB further comprises at least

CLAIMS

1. A printed circuit board, comprising:

a substrate comprising an insulating material;

a plurality of conductive tracks attached to at least one surface of the substrate;

a multi-layer coating deposited on the at least one surface of the substrate, the multi-layer coating covering at least a portion of the plurality of conductive tracks, the multi-layer coating comprising at least one layer formed of a halo-hydrocarbon polymer; and

at least one electrical component connected by a solder joint to at least one conductive track, wherein the solder joint is soldered through the multi-layer coating such that the solder joint abuts the multi-layer coating.

2. The printed circuit board of Claim 1, wherein the multi-layer coating has a thickness of from 1 nanometer to 10 micrometers.

3. The printed circuit board of Claim 1, wherein the multi-layer coating comprises a first layer and a second layer that are distinct from each other, the first layer and the second layer comprising different polymers.

4. The printed circuit board of Claim 1, wherein:

the multi-layer coating comprises a first layer comprising a particular type of polymer;

the multi-layer coating comprises a second layer comprising the particular type of polymer;

the polymer in the first layer differs from the polymer in the second layer with respect to at least one of the following properties:

molecular weight;

chemical composition;

structure;

geometry; and

porosity.

5. The printed circuit board of Claim 1, wherein:

the multi-layer coating comprises a particular layer of a first polymer and another layer of a second polymer, the layers abutting each other; and

the layers are graded such that the multi-layer coating transitions from the first polymer to the second polymer.

6. The printed circuit board of Claim 1, wherein the multi-layer coating comprises a particular layer formed of a halo-hydrocarbon polymer and another layer formed of a polymer free of halogen atoms.

7. The printed circuit board of Claim 1, wherein the multi-layer coating is deposited such that a metal halide layer covers at least a portion of the plurality of conductive tracks.

8. The printed circuit board of Claim 1, wherein the multi-layer coating is deposited such that there is essentially no metal halide layer between the plurality of conductive tracks and the multi-layer coating.

9. The printed circuit board of Claim 1, wherein the halo-hydrocarbon polymer comprises one or more fluoro-hydrocarbons.

10. The printed circuit board of Claim 1, wherein the multi-layer coating comprises:

a first layer comprising a fluoro-hydrocarbon material; and

a second layer comprising a chlorofluoro-hydrocarbon material.

11. The printed circuit board of Claim 10, wherein the second layer is formed between the first layer and the plurality of conductive tracks.

12. The printed circuit board of Claim 10, wherein the first layer is formed between the second layer and the plurality of conductive tracks.

13. The printed circuit board of Claim 1, wherein:

the solder joint is formed on a particular region of the substrate after a substantially continuous layer of the multi-layer coating is deposited on the substrate; and

the soldering alters the multi-layer coating at the particular region of the substrate without altering the multi-layer coating at other regions of the substrate.

14. The printed circuit board of Claim 13, wherein the soldering alters the multi-layer coating at the particular region of the substrate by removing the multi-layer coating from the particular region of the substrate without removing the multi-layer coating from other regions of the substrate.

15. The printed circuit board of Claim 1, wherein:

a first region of the substrate is coated with the multi-layer coating; and

a second region of the substrate is coated with another coating.

16. The printed circuit board of Claim 15, further comprising a contact attached to at least one surface of the substrate, the contact coated with the single-layer coating, the contact operable to conduct an electrical signal through the single-layer coating to another contact.

17. The printed circuit board of Claim 1, further comprising a contact attached to at least one surface of the substrate, the contact coated with the multi-layer coating, the contact operable to conduct an electrical signal through the multi-layer coating to another contact.

18. The printed circuit board of Claim 1, further comprising at least one wire that is connected by a wire bond to at least one conductive track, the wire bond

formed through the multi-layer coating such that the wire bond abuts the multi-layer coating.

19. The printed circuit board of Claim 1, wherein heating a flux at a particular region of the substrate alters the multi-layer coating at the particular region of the substrate without altering the multi-layer coating at other regions of the substrate.

20. The printed circuit board of Claim 1, wherein the substrate comprises at least one of:

an epoxy resin bonded glass fabric;

a synthetic resin bonded paper;

an epoxy;

a cotton paper;

a cardboard;

a natural wood based material; and

a synthetic wood based material.

21. The printed circuit board of Claim 1, wherein at least one layer of the multi-layer coating comprises a metal material.

22. A method, comprising:

attaching a plurality of conductive tracks to at least one surface of a substrate comprising an insulating material;

depositing a multi-layer coating on the at least one surface of the substrate, the multi-layer coating covering at least a portion of the plurality of conductive tracks, at least one layer of the multi-layer coating comprising at least one halo-hydrocarbon polymer; and

after depositing the multi-layer coating, soldering through the multi-layer coating to form a solder joint between an electrical component and at least one conductive track attached to the substrate, the solder joint abutting the multi-layer coating.

23. The method of Claim 22, wherein the multi-layer coating has a thickness of from 1 nanometer to 10 micrometers.

24. The method of Claim 22, wherein the multi-layer coating comprises a first layer and a second layer that are distinct from each other, the first layer and the second layer comprising different polymers.

25. The method of Claim 22, wherein:

the multi-layer coating comprises a first layer comprising a particular type of polymer;

the multi-layer coating comprises a second layer comprising the particular type of polymer;

the polymer in the first layer differs from the polymer in the second layer with respect to at least one of the following properties:

molecular weight;

chemical composition;

structure;

geometry; and

porosity.

26. The method of Claim 22, wherein:

the multi-layer coating comprises a particular layer of a first polymer and another layer of a second polymer, the layers abutting each other; and

the layers are graded such that the multi-layer coating transitions from the first polymer to the second polymer.

27. The method of Claim 22, wherein the multi-layer coating comprises a particular layer formed of a halo-hydrocarbon polymer and another layer formed of a polymer free of halogen atoms.

28. The method of Claim 22, wherein the multi-layer coating is deposited such that a metal halide layer covers at least a portion of the plurality of conductive tracks.

29. The method of Claim 22, wherein the multi-layer coating is deposited such that there is essentially no metal halide layer between the plurality of conductive tracks and the multi-layer coating.

30. The method of Claim 22, wherein the halo-hydrocarbon polymer comprises one or more fluoro-hydrocarbons.

31. The method of Claim 22, wherein the multi-layer coating comprises:

a first layer comprising a fluoro-hydrocarbon material; and

a second layer comprising a chlorofluoro-hydrocarbon material.

32. The method of Claim 31, wherein the second layer is formed between the first layer and the plurality of conductive tracks.

33. The method of Claim 31, wherein the first layer is formed between the second layer and the plurality of conductive tracks.

34. The method of Claim 22, wherein:

the solder joint is formed on a particular region of the substrate after a substantially continuous layer of the multi-layer coating is deposited on the substrate; and

the soldering alters the multi-layer coating at the particular region of the substrate without altering the multi-layer coating at other regions of the substrate.

35. The method of Claim 34, wherein the soldering alters the multi-layer coating at the particular region of the substrate by removing the multi-layer coating from the particular region of the substrate without removing the multi-layer coating from other regions of the substrate.

36. The method of Claim 22, wherein:

a first region of the substrate is coated with the multi-layer coating; and

a second region of the substrate is coated with another coating.

37. The method of Claim 36, further comprising:

attaching a contact to at least one surface of the substrate, the contact coated with the single-layer coating, the contact operable to conduct an electrical signal through the single-layer coating to another contact.

38. The method of Claim 22, further comprising:

attaching a contact to at least one surface of the substrate, the contact coated with the multi-layer coating, the contact operable to conduct an electrical signal through the multi-layer coating to another contact.

39. The method of Claim 22, further comprising:

forming a wire bond through the multi-layer coating, the wire bond connecting at least one wire to at least one conductive track, the wire bond abutting the multi-layer coating.

40. The method of Claim 22, further comprising:

modifying a wetting characteristic of the multi-layer coating by at least one of the following:

plasma cleaning;

plasma etching;

plasma activation;

plasma polymerization and coating; and

liquid based chemical etching.

41. The method of Claim 22, wherein the multi-layer coating is deposited by at least one of the following:

plasma deposition;

chemical vapor deposition;

metallo-organic-chemical vapor deposition;

molecular beam epitaxy;

spray coating;

sputtering; and

spin coating.

42. The method of Claim 22, wherein:

the substrate is comprised in a printed circuit board; and

the coating causes the printed circuit board to be flame retardant.

43. The method of Claim 22, further comprising, during the soldering, controlling wetting of the multi-layer coating.

44. The method of Claim 22, further comprising balancing solderability and protectability of coating, the balancing achieved at least in part by controlling porosity and wetting of the multi-layer coating.

45. The method of Claim 22, further comprising:

after formation of the solder joint, depositing a conformal coating on the printed circuit board, the conformal coating comprising at least one halo-hydrocarbon polymer, the conformal coating having at least one of the following properties:

solder-through capability;

capability to permit wire bonding through the conformal coating; and

conductivity along an axis perpendicular to a surface coated with the conformal coating.

46. The method of Claim 22, further comprising:

after formation of the solder joint, depositing a conformal coating on the printed circuit board, the conformal coating comprising at least one halo-hydrocarbon polymer, wherein:

the conformal coating is insulative along an axis perpendicular to a surface coated with the conformal coating; and

the conformal coating has at least one of the following properties:

solder-through capability; and

capability to permit wire bonding through the conformal coating.

47. A printed circuit board, comprising:

a substrate comprising an insulating material;

a plurality of conductive tracks attached to at least one surface of the substrate;

a coating deposited on the at least one surface of the substrate, wherein:

the coating covers at least a portion of the plurality of conductive tracks; and

comprises at least one halo-hydrocarbon polymer; and

at least one conductive wire that is connected by a wire bond to at least one conductive track, the wire bond formed through the coating without prior removal of the coating such that the wire bond abuts the coating.

48. The printed circuit board of Claim 47, wherein the wire bond abuts the coating along a plane parallel to the at least one surface of the substrate.

49. The printed circuit board of Claim 47, wherein the wire bond is at least one of:

a ball bond; and

a wedge bond.

50. The printed circuit board of Claim 47, wherein the wire comprises at least one of:

gold;

aluminum;

silver;

copper;

nickel; and

iron.

51. The printed circuit board of Claim 47, wherein at least a portion of the wire is covered with the coating.

52. The printed circuit board of Claim 47, wherein the coating has a thickness of from 1 nanometers to 2 micrometers.

53. The printed circuit board of Claim 47, wherein the coating has a thickness of from 10 nanometers to 100 nanometers.

54. The printed circuit board of Claim 47, wherein the at least one halo-hydrocarbon polymer is a fluoro-hydrocarbon polymer.

55. The printed circuit board of Claim 47, wherein the wire bond is formed at a particular region of the substrate, the formation of the wire bond altering the coating at the particular region without altering the coating at other regions of the substrate.

56. The printed circuit board of Claim 55, wherein:

the coating is not removed from the particular region of the substrate prior to the formation of the wire bond; and

the formation of the wire bond alters the coating at the particular region of the substrate by selectively removing the coating from the particular region of the substrate.

57. The printed circuit board of Claim 47, further comprising at least one electrical component connected by a solder joint to at least one conductive track, wherein the solder joint is soldered through the coating such that the solder joint abuts the coating.

58. The printed circuit board of Claim 47, wherein the wire bond is formed at a first region of the substrate, the first region coated with the coating, and further comprising:

at least one electrical component connected by a solder joint to at least one conductive track at a second region of the substrate, the second region coated with another coating.

59. The printed circuit board of Claim 47, further comprising a contact attached to at least one surface of the substrate, the contact coated with the coating, the contact operable to conduct an electrical signal through the coating to another contact.

60. The printed circuit board of Claim 47, wherein the coating is deposited such that a metal halide layer covers at least a portion of the plurality of conductive tracks.

61. The printed circuit board of Claim 47, wherein the coating is deposited such that there is essentially no metal halide layer between the plurality of conductive tracks and the coating.

62. A method, comprising:

attaching a plurality of conductive tracks to at least one surface of a substrate comprising an insulating material;

depositing a coating on the at least one surface of the substrate, the coating covering at least a portion of the plurality of conductive tracks, the coating comprising at least one halo-hydrocarbon polymer; and

forming a wire bond between at least one conductive wire and at least one conductive track, the wire bond formed through the coating without prior removal of the coating such that the wire bond abuts the coating.

63. The method of Claim 62, wherein the wire bond abuts the coating along a plane parallel to the at least one surface of the substrate.

64. The method of Claim 62, wherein the wire bond is at least one of:

a ball bond; and

a wedge bond.

65. The method of Claim 62, wherein the wire comprises at least one of:

gold;

aluminum;

silver;

copper;

nickel; and

iron.

66. The method of Claim 62, wherein at least a portion of the wire is covered with the coating prior to formation of the wire bond.

67. The method of Claim 62, wherein the coating has a thickness of from 1 nanometers to 2 micrometers.

68. The method of Claim 62, wherein the coating has a thickness of from 10 nanometers to 100 nanometers.

69. The method of Claim 62, wherein the at least one halo-hydrocarbon polymer is a fluoro-hydrocarbon polymer.

70. The method of Claim 62, wherein the wire bond is formed at a particular region of the substrate, the formation of the wire bond altering the coating at the particular region without altering the coating at other regions of the substrate.

71. The method of Claim 70, wherein:

the coating is not removed from the particular region of the substrate prior to the formation of the wire bond; and

the formation of the wire bond alters the coating at the particular region of the substrate by selectively removing the coating from the particular region of the substrate.

72. The method of Claim 62, further comprising:

after depositing the coating, soldering through the coating to form a solder joint between an electrical component and at least one conductive track attached to the substrate, the solder joint abutting the coating.

73. The method of Claim 62, wherein the wire bond is formed at a first region of the substrate, the first region coated with the coating, and further comprising:

depositing another coating on a second region of the substrate; and

soldering through the other coating on the second region of the substrate to form a solder joint between an electrical component and at least one conductive track attached to the substrate.

74. The method of Claim 62, further comprising:

affixing a contact to at least one surface of the substrate, the contact coated with the coating, the contact operable to conduct an electrical signal through the coating to another contact.

75. The method of Claim 62, wherein depositing the coating comprises depositing a first layer of the coating, and further comprising, after formation of the wire bond, depositing a second layer of the coating on the at least one surface of the substrate, the second layer of the coating covering at least a portion of the wire bond.

76. The method of Claim 62, wherein the wire bond is a bare die wire bond.

77. The method of Claim 62, wherein the substrate is comprised in a printed circuit board, and further comprising:

after formation of the wire bond, depositing a conformal coating on the printed circuit board, the conformal coating comprising at least one halo-hydrocarbon polymer, the conformal coating having at least one of the following properties:

solder-through capability;

capability to permit wire bonding through the conformal coating; and

conductivity along an axis perpendicular to a surface coated with the conformal coating.

78. An apparatus, comprising:

a substrate comprising an insulating material;

a first contact attached to at least one surface of the substrate; and

a coating deposited on at least one surface of the first contact, the coating comprising at least one halo-hydrocarbon polymer, the first contact operable to conduct an electrical signal through the coating to a second contact without removal of the coating.

79. The apparatus of Claim 78, wherein the coating exhibits greater conductivity along an axis parallel to the at least one surface of the first contact than along an axis perpendicular to the at least one surface of the first contact.

80. The apparatus of Claim 78, wherein:

the coating is a conductor along an axis perpendicular to the at least one surface of the first contact; and

the coating is an insulator along an axis parallel to the at least one surface of the first contact.

81. The apparatus of Claim 78, wherein:

the second contact is movable from a first position to a second position; and

when the second contact is in the second position, the first contact conducts an electrical signal through the coating to the second contact.

82. The apparatus of Claim 78, wherein the first contact comprises at least one of:

stainless steel;

silver;

carbon;

nickel;

gold; and

tin.

83. The apparatus of Claim 78, wherein the first contact is comprised in a printed circuit board and the second contact is comprised in a key in a keypad.

84. The apparatus of Claim 78, wherein the first contact is comprised in a sensor.

85. The apparatus of Claim 84, wherein the sensor operates to detect the presence of analytes.

86. The apparatus of Claim 84, wherein the first contact comprises at least one of:

carbon;
a conductive glue;
a conductive adhesive;
a conductive ink; and
silver loaded epoxy.

87. The apparatus of Claim 86, wherein the first contact is an electrode.

88. The apparatus of Claim 78, wherein the coating has a thickness of from 1 nanometer to 2 micrometers.

89. The apparatus of Claim 78, wherein the coating has a thickness of from ten nanometers to 100 nanometers.

90. The apparatus of Claim 78, wherein the coating prevents the first contact from oxidizing, corroding, and absorbing moisture.

91. The apparatus of Claim 78, wherein the at least one halo-hydrocarbon polymer comprises a fluoro-hydrocarbon polymer.

92. The apparatus of Claim 78, wherein the first contact operates as a test point.

93. A method, comprising:

attaching a first contact to at least one surface of a substrate comprising an insulating material;

depositing a coating on at least one surface of the first contact, the coating comprising at least one halo-hydrocarbon polymer, the first contact operable to conduct an electrical signal through the coating to a second contact without removal of the coating.

94. The method of Claim 93, wherein the coating exhibits greater conductivity along an axis parallel to the at least one surface of the first contact than along an axis perpendicular to the at least one surface of the first contact.

95. The method of Claim 93, wherein:

the coating is a conductor along an axis perpendicular to the at least one surface of the first contact; and

the coating is an insulator along an axis parallel to the at least one surface of the first contact.

96. The method of Claim 93, wherein:

the second contact is movable from a first position to a second position; and

when the second contact is in the second position, the first contact conducts an electrical signal through the coating to the second contact.

97. The method of Claim 93, wherein the first contact comprises at least one of:

stainless steel;

silver;

carbon;

nickel;

gold; and

tin.

98. The method of Claim 93, wherein the first contact is comprised in a printed circuit board and the second contact is comprised in a key in a keypad.

99. The method of Claim 93, wherein the first contact is comprised in a sensor.

100. The method of Claim 99, wherein the sensor operates to detect the presence of analytes.

101. The method of Claim 99, wherein the first contact comprises at least one of:

carbon;
a conductive glue;
a conductive adhesive;
a conductive ink; and
silver loaded epoxy.

102. The method of Claim 93, wherein the first contact is an electrode.

103. The method of Claim 93, wherein the coating has a thickness of from 1 nanometer to 2 micrometers.

104. The method of Claim 93, wherein the coating has a thickness of from ten nanometers to 100 nanometers.

105. The method of Claim 93, wherein the coating prevents the first contact from oxidizing, corroding, and absorbing moisture.

106. The method of Claim 93, wherein the at least one halo-hydrocarbon polymer comprises a fluoro-hydrocarbon polymer.

107. The method of Claim 93, wherein the coating is deposited by plasma deposition.

108. The method of Claim 93, wherein the first contact operates as a test point.

CLAIMS

1. A printed circuit board, comprising:

a substrate comprising an insulating material;

a plurality of conductive tracks attached to at least one surface of the substrate;

a coating deposited on the at least one surface of the substrate, wherein:

the coating covers at least a portion of the plurality of conductive tracks; and

comprises at least one halo-hydrocarbon polymer;

and

at least one conductive wire that is connected by a wire bond to at least one conductive track at a particular region of the substrate, the wire bond formed through the coating without prior removal of the coating such that the wire bond connects the at least one conductive wire directly to the at least one conductive track at the particular region and the coating abuts the wire bond at the particular region.

2. The printed circuit board of claim 1, wherein:

(a) the wire bond abuts the coating along a plane parallel to the at least one surface of the substrate; or

(b) the wire bond is at least one of a ball bond and a wedge bond.

3. The printed circuit board of claim 1 or claim 2, wherein:

(a) the wire comprises at least one of gold; aluminum; silver; copper; nickel; and iron; or

(b) at least a portion of the wire is covered with the coating.

4. The printed circuit board of any one of the preceding claims, wherein:

(a) the coating has a thickness of from 1 nanometers to 2 micrometers; or

(b) the coating has a thickness of from 10 nanometers to 100 nanometers.

5. The printed circuit board of any one of the preceding claims, wherein the at least one halo-hydrocarbon polymer is a fluoro-hydrocarbon polymer.

6. The printed circuit board of any one of the preceding claims, wherein the wire bond is formed at a particular region of the substrate, the formation of the wire bond altering the coating at the particular region without altering the coating at other regions of the substrate.

7. The printed circuit board of claim 6, wherein:

the coating is not removed from the particular region of the substrate prior to the formation of the wire bond; and

the formation of the wire bond alters the coating at the particular region of the substrate by selectively removing the coating from the particular region of the substrate.

8. The printed circuit board of any one of the preceding claims, further comprising at least one electrical component connected by a solder joint to at least one conductive track, wherein the solder joint is soldered through the coating such that the solder joint abuts the coating.

9. The printed circuit board of any one of the preceding claims, wherein the wire bond is formed at a first region of the substrate, the first region coated with the coating, and further comprising:

at least one electrical component connected by a solder joint to at least one conductive track at a second region of the substrate, the second region coated with another coating.

10. The printed circuit board of any one of the preceding claims, wherein the coating is deposited such that (a) a metal halide layer covers at least a portion of the plurality of conductive tracks, or (b) there is essentially no metal halide layer between the plurality of conductive tracks and the coating.

11. A method, comprising:

attaching a plurality of conductive tracks to at least one surface of a substrate comprising an insulating material;

depositing a coating on the at least one surface of the substrate, the coating covering at least a portion of the plurality of conductive tracks, the coating comprising at least one halo-hydrocarbon polymer; and

forming a wire bond between at least one conductive wire and at least one conductive track at a particular region of the substrate, the wire bond formed through the coating without prior removal of the coating such that the wire bond connects the at least one conductive wire directly to the at least one conductive track at the particular region and the coating abuts the wire bond at the particular region.

12. The method of claim 11, wherein:

(a) the wire bond abuts the coating along a plane parallel to the at least one surface of the substrate; or

(b) the wire bond is at least one of a ball bond and a wedge bond; or

(c) the wire comprises at least one of gold; aluminum; silver; copper; nickel; and iron; or

(d) at least a portion of the wire is covered with the coating prior to formation of the wire bond.

13. The method of claim 11 or claim 12, wherein:

(a) the coating has a thickness of from 1 nanometers to 2 micrometers; or

(b) the coating has a thickness of from 10 nanometers to 100 nanometers; or

(c) the at least one halo-hydrocarbon polymer is a fluoro-hydrocarbon polymer.

14. The method of any one of the preceding claims 11 to 13, wherein the wire bond is formed at a particular region of the substrate, the formation of the wire bond altering the coating at the particular region without altering the coating at other regions of the substrate.

15. The method of claim 14, wherein:

the coating is not removed from the particular region of the substrate prior to the formation of the wire bond; and

the formation of the wire bond alters the coating at the particular region of the substrate by selectively removing the coating from the particular region of the substrate.

16. The method of any one of the preceding claims 11 to 15, further comprising:

after depositing the coating, soldering through the coating to form a solder joint between an electrical component and at least one conductive track attached to the substrate, the solder joint abutting the coating.

17. The method of any one of the preceding claims 11 to 16, wherein the wire bond is formed at a first region of the substrate, the first region coated with the coating, and further comprising:

depositing another coating on a second region of the substrate; and

soldering through the other coating on the second region of the substrate to form a solder joint between an electrical component and at least one conductive track attached to the substrate.

18. The method of any one of the preceding claims 11 to 17, wherein depositing the coating comprises depositing a first layer of the coating, and further comprising, after formation of the wire bond, depositing a second layer of the coating on the at least one surface of the substrate, the second layer of the coating covering at least a portion of the wire bond.

19. The method of any one of the preceding claims 11 to 18, wherein the wire bond is a bare die wire bond.

20. The method of any one of the preceding claims 11 to 19, wherein the substrate is comprised in a printed circuit board, and further comprising:

after formation of the wire bond, depositing a conformal coating on the printed circuit board, the conformal coating comprising at least one halo-hydrocarbon polymer, the conformal coating having at least one of the following properties:

solder-through capability; and

capability to permit wire bonding through the conformal coating.