CLAIMS:

1. An abrasive article comprising:

a substrate comprising a wire;

abrasive particles affixed to the substrate, the abrasive particles comprising:

a first coating layer overlying the abrasive particles; and

a second coating layer different than the first coating layer overlying the first coating layer; and

a bonding layer overlying the substrate and abrasive particles.

2. An abrasive article comprising:

a substrate comprising an elongated body having an aspect ratio of length:width of at least about 10:1;

abrasive particles affixed to the substrate;

a discontinuous coating including a metal material defining coated regions comprising a low temperature metal alloy (LTMA) material surrounding and overlying a majority of the abrasive particles and gap region between the abrasive particles.

3. The abrasive article of any one of claims 1 and 2, wherein the substrate comprises an inorganic material.

4. The abrasive article of any one of claims 1 and 2, wherein the substrate comprises a material selected from the group of materials consisting of metals, metal alloys, and a combination thereof.

5. The abrasive article of any one of claims 1 and 2, wherein the substrate comprises a metal comprising a transition metal element, wherein the substrate comprises steel.

6. The abrasive article of any one of claims 1 and 2, wherein the substrate comprises a coating overlying an outer surface of the substrate.

7. The abrasive article of claim 6, wherein the substrate comprises a coating layer directly bonded to an outer surface of the substrate.

8. The abrasive article of claim 1, wherein the substrate comprises an elongated member having an aspect ratio of length:width of at least about 10:1.

9. The abrasive article of any one of claims 1 and 2, wherein the substrate comprises an elongated member having an aspect ratio of length:width of at least about 100:1.

10. The abrasive article of any one of claims 1 and 2, wherein the substrate comprises an average length of at least about 50 m.

11. The abrasive article of any one of claims 1 and 2, wherein the substrate comprises an average width of not greater than about 1 cm.

12. The abrasive article of any one of claims 1 and 2, wherein the substrate comprises an average width of at least about 0.01 mm, wherein the substrate comprises an average width of at least about 0.03 mm.

13. The abrasive article of any one of claims 1 and 2, wherein the substrate consists essentially of a wire.

14. The abrasive article of any one of claims 1 and 2, wherein the substrate comprises a plurality of filaments braided together.

15. The abrasive article of claim 1, wherein the first coating layer comprises a material selected from the group of materials consisting of metals, metal alloys, and a combination thereof.

16. The abrasive article of claim 1, wherein the first coating layer comprises a transition metal element.

17. The abrasive article of claim 1, wherein the first coating layer comprises a metal selected from the group of metals consisting of titanium, vanadium, chromium, molybdenum, iron, cobalt, nickel, copper, silver, zinc, manganese, tantalum, tungsten, and a combination thereof.

18. The abrasive article of claim 1, wherein the first coating layer consists essentially of nickel.

19. The abrasive article of claim 1, wherein the first coating layer consists essentially of copper.

20. The abrasive article of claim 2, wherein the discontinuous coating comprises a first coating layer comprising a material selected from the group of materials consisting of metals, metal alloys.

21. The abrasive article of claim 2, wherein the first coating layer comprises a metal selected from the group of metals consisting of titanium, vanadium, chromium, molybdenum, iron, cobalt, nickel, copper, silver, zinc, manganese, tantalum, tungsten, and a combination thereof.

22. The abrasive article of claim 2, wherein the first coating layer consists essentially of nickel or consists essentially of copper.

23. The abrasive article of claim 1, wherein the first coating layer overlies at least about 50% of an exterior surface area of each of the abrasive particles.

24. The abrasive article of claim 1, wherein the first coating layer overlies essentially the entire exterior surface area of each of the abrasive particles.

25. The abrasive article of any one of claims 1 and 2, wherein the coating layer is in direct contact with an external surface of each of the abrasive particles.

26. The abrasive article of any one of claims 1 and 2, wherein the coating layer is electroplated directly to an external surface of each of the abrasive particles.

27. The abrasive article of any one of claims 1 and 2, wherein the first coating layer comprises at least about 5 % of the total weight of each of the abrasive particles.

28. The abrasive article of any one of claims 1 and 2, wherein the first coating layer comprises not greater than about 60% of the total weight of each of the abrasive particles.

29. The abrasive article of claim 1, wherein the first coating layer comprises an average thickness greater than an average thickness of the second coating layer.

30. The abrasive article of claim 1, wherein the first coating layer comprises an average thickness less than an average thickness of the second coating layer.

31. The abrasive article of claim 1, wherein the first coating layer comprises an average thickness substantially equal to an average thickness of the second coating layer.

32. The abrasive article of claim 1, wherein the first coating layer comprises an average thickness of not greater than about 12 microns.

33. The abrasive article of claim 1, wherein the first coating layer comprises an average thickness of at least about 0.2 microns.

34. The abrasive article of claim 1, wherein the second coating layer comprises a material selected from the group of materials consisting of metal, metal alloys, metal matrix composites, and a combination thereof.

35. The abrasive article of claim 1, wherein the second coating layer comprises a transition metal element.

36. The abrasive article of claim 1, wherein the second coating layer comprises an alloy of transition metal elements, wherein the second coating layer comprises a metal selected from the group of metals consisting of lead, silver, copper, zinc, tin, titanium, molybdenum, chromium, iron, manganese, cobalt, niobium, tantalum, tungsten, palladium, platinum, gold, ruthenium, and a combination thereof.

37. The abrasive article of claim 1, wherein the second coating layer comprises a metal alloy of tin and lead, wherein the second coating layer comprises tin, wherein the second coating layer consists essentially of tin.

38. The abrasive article of claim 1, wherein the second coating layer comprises a low temperature metal alloy (LTMA) material.

39. The abrasive article of claim 1, wherein the second coating layer has a melting point of not greater than about 450°C.

40. The abrasive article of claim 1, wherein the second coating layer directly contacts an exterior surface of the first coating layer.

41. The abrasive article of claim 1, wherein the second coating layer overlies at least about 50% of an exterior surface area of the first coating layer on each of the abrasive particles.

42. The abrasive article of claim 1, wherein the second coating layer comprises at least about 10% of the total weight of each of the abrasive particle and the first coating layer.

43. The abrasive article of claim 1, wherein the second coating layer comprises an average thickness of not greater than about 12 microns.

44. The abrasive article of claim 1, wherein the second coating layer comprises an average thickness of not greater than about 80% of an average particle size of the abrasive particles.

45. The abrasive article of claim 2, wherein the discontinuous coating includes a first coating layer and a second coating layer.

46. The abrasive article of any one of claims 1 and 2, wherein the abrasive particles comprise a material selected from the group of materials consisting of oxides, carbides, nitrides, borides, oxynitrides, oxyborides, diamond, and a combination thereof.

47. The abrasive article of any one of claims 1 and 2, wherein the abrasive particles comprise an average particle size of not greater than about 500 microns.

48. The abrasive article of claim 1, wherein the bonding layer directly contacts the second coating layer.

49. The abrasive article of claim 1, wherein the bonding layer overlies a majority of an external surface of the substrate and an external surface of the abrasive particles.

50. The abrasive article of claim 1, wherein the bonding layer overlies at least about 90% of the external surfaces of the substrate and abrasive particles.

51. The abrasive article of claim 1, wherein the bonding layer comprises a material selected from the group of materials consisting of metals, metal alloys, cermets, ceramics, composites, and a combination thereof.

52. The abrasive article of claim 1, wherein the bonding layer comprises a metal selected from the group of metals consisting of lead, silver, copper, zinc, tin, titanium, molybdenum, chromium, iron, manganese, cobalt, niobium, tantalum, tungsten, palladium, platinum, gold, ruthenium, and a combination thereof.

53. The abrasive article of claim 1, wherein the bonding layer consists essentially of nickel.

54. The abrasive article of claim 1, wherein the bonding layer comprises an average thickness of at least about 10% of an average particle size of the abrasive particles.

55. The abrasive article of claim 1, wherein the bonding layer comprises an average thickness of not greater than about 100% of an average particle size of the abrasive particles.

56. The abrasive article of claim 1, wherein the bonding layer comprise an average thickness of at least about 1 micron.

57. The abrasive article of claim 1, wherein the bonding layer comprises an average thickness of not greater than about 100 microns.

58. A method of forming an abrasive article comprising:

providing a substrate comprising an elongated body having an aspect ratio of length:width of at least about 10:1;

treating the substrate to form a binding film;

placing abrasive particles comprising a second coating layer including a low temperature metal alloy (LTMA) material on the binding film;

treating the substrate to bond the abrasive particles to the substrate; and

forming a bonding layer over the abrasive particles.

59. The method of claim 58, wherein providing a substrate comprises providing a wire connected to a feed spool and a receiving spool, wherein providing a substrate comprises spooling the wire at a rate of not less than about 5 m/min from the feed spool to the receiving spool.

60. The method of claim 58, wherein treating the substrate to form the binding film comprises applying a continuous coating of the binding film to an exterior surface of the substrate, wherein treating the substrate to form a binding film comprises a method selected from the group consisting of deposition, spraying, printing, dipping, die coating, and a combination thereof, wherein the binding film is bonded directly to a surface of the substrate, wherein the binding layer comprises a flux material.

61. The method of claim 58, wherein treating the substrate comprises applying a flux material to an external surface of the substrate, wherein treating comprises forming a continuous layer of flux material over an external surface of the substrate.

62. The method of claim 58, wherein placing the abrasive grains on the binding film comprises a process selected from the group consisting of spraying, gravity coating, dipping, die coating, electrostatic coating, and a combination thereof.

63. The method of claim 58, wherein the second coating layer is bonded to the substrate at a diffusion bonding region defined by interdiffusion of elements of the second coating film and the substrate, wherein the diffusion bonding region is localized to regions around the abrasive particles, further comprising gaps in the diffusion bonding region at locations between the abrasive particles.

64. The method of claim 58, wherein the abrasive particles comprise a second coating layer overlying a core material, wherein the second coating layer comprises a material selected from the group of materials consisting of metal, metal alloys, metal matrix composites, and a combination thereof, wherein the second coating layer comprises a transition metal element, wherein the second coating layer comprises a metal alloy of tin and lead, wherein the second coating layer comprises tin, wherein the second coating layer has a melting point of not greater than about 450°C.

65. The method of claim 58, wherein treating the substrate to bond the abrasive particles comprises a process selected from the group consisting of heating, curing, drying, and a combination thereof, wherein treating comprises heating the second coating layer at a temperature of not greater than about 450°C, wherein treating comprises heating the second coating layer to melt the second coating layer and form a diffusion bonding region between the second coating layer and the binding film.

66. The method of claim 58, wherein forming a bonding layer comprises a process of coating the bonding layer directly on the abrasive particles and the substrate, wherein the process of forming the bonding layer comprises a process selected from the group of processes including plating, spraying, printing, dipping, and a combination thereof, wherein the bonding layer comprises a material selected from the group of materials

consisting of organic materials, inorganic materials, and a combination thereof, wherein the bonding layer comprises fillers, wherein the fillers comprise secondary abrasive particles, wherein the bonding layer comprises a metal or metal alloy, wherein the bonding layer comprises nickel.

67. A method of forming an abrasive article comprising:

providing a substrate comprising an elongated body having an aspect ratio of length:width of at least about 10:1;

treating the substrate to form a binding film;

placing abrasive particles on the binding film, the abrasive particles comprising a first coating layer including a metal, and a second coating layer overlying the first coating layer including a low temperature metal alloy (LTMA) material; and

heating the substrate to form a diffusion bonding region between the second coating layer of the abrasive particles and portions of the substrate.

CLAIMS:

1. An abrasive article comprising:

a substrate comprising a wire;

abrasive particles affixed to the substrate, the abrasive particles comprising:

a first coating layer overlying the abrasive particles; and

a second coating layer different than the first coating layer overlying the first coating layer, wherein the second coating layer comprises a low temperature metal alloy (LTMA) material having a melting point of not greater than about 450 °C; and

a bonding layer overlying the substrate and abrasive particles.

2. An abrasive article comprising:

a substrate comprising an elongated body having an aspect ratio of length:width of at least about 10:1;

abrasive particles affixed to the substrate;

a discontinuous coating including a metal material defining coated regions comprising a low temperature metal alloy (LTMA) material surrounding and overlying at least 50% of the exterior surface area of the abrasive particles and gap region between the abrasive particles, wherein the low temperature metal alloy (LTMA) material has a melting point of not greater than about 450 °C.

3. The abrasive article of claim 1, wherein the first coating layer comprises a metal selected from the group of metals consisting of titanium, vanadium, chromium, molybdenum, iron, cobalt, nickel, copper, silver, zinc, manganese, tantalum, tungsten, and a combination thereof.

4. The abrasive article of claim 1, wherein the first coating layer consists of nickel.

5. The abrasive article of claim 1, wherein the first coating layer consists of copper.

6. The abrasive article of claim 1, wherein the first coating layer overlies at least about 50% of an exterior surface area of each of the abrasive particles.

7. The abrasive article of any one of claims 1 and 2, wherein the coating layer is electroplated directly to an external surface of each of the abrasive particles.

8. The abrasive article of claim 1, wherein the first coating layer comprises at least about 5 % of the total weight of each of the abrasive particles.

9. The abrasive article of claim 1, wherein the first coating layer comprises not greater than about 60% of the total weight of each of the abrasive particles.

10. The abrasive article of claim 1, wherein the second coating layer comprises a metal alloy of tin and lead, wherein the second coating layer comprises tin, wherein the second coating layer consists essentially of tin.

11. A method of forming an abrasive article comprising:

providing a substrate comprising an elongated body having an aspect ratio of length:width of at least about 10:1;

treating the substrate to form a binding film;

placing abrasive particles comprising a second coating layer including a low temperature metal alloy (LTMA) material on the binding film, wherein the low temperature metal alloy (LTMA) material has a melting point of not greater than about 450 °C;

treating the substrate to bond the abrasive particles to the substrate; and

forming a bonding layer over the abrasive particles.

12. The method of claim 11, wherein providing a substrate comprises providing a wire connected to a feed spool and a receiving spool, wherein providing a substrate comprises spooling the wire at a rate of not less than about 5 m/min from the feed spool to the receiving spool.

13. The method of claim 11, wherein treating the substrate to form the binding film comprises applying a continuous coating of the binding film to an

exterior surface of the substrate, wherein treating the substrate to form a binding film comprises a method selected from the group consisting of deposition, spraying, printing, dipping, die coating, and a combination thereof, wherein the binding film is bonded directly to a surface of the substrate, wherein the binding layer comprises a flux material.