CLAIMS

1. A composition for semi-permanently tattooing a subject's skin, comprising:

(i) a particle that comprises:

(a) a shell comprising a shell polymer that is bioabsorbable, biodegradable, and present in an amount that is effective to induce aggregation of the particle upon incorporation into a subject's skin, wherein the shell polymer comprises poly(sebacic anhydride) (poly(SA)), polyorthoester, aliphatic polyanhydride, or aromatic polyanhydride; and

(b) a core comprising a coloring agent having a molecular weight of 5 to $10x10^6$ Daltons; and

(ii) a carrier solution;

wherein the particle is present in the carrier solution at a concentration of 5% w/v to 60% w/v of the carrier solution.

2. The composition of claim 1, wherein the composition is useful as a semi-permanent tattoo ink which retains its vibrancy for 2 months to 12 months.

3. The composition of claim 1, wherein the particle has an average diameter of less than 100 μm.

4. The composition of claim 1, wherein the shell polymer has a weight average molecular weight between 50 Da to 200 kDa, inclusive.

5. The composition of claim 1, wherein the shell polymer undergoes surface or bulk erosion in aqueous solution.

6. The composition of claim 1, being configured such that at least one of a bioabsorption profile or a biodegradation profile exhibits a lag phase of 2 months to 12 months.

7. The composition of claim 1, wherein the coloring agent is a dye, is a pigment, is fluorescent, or is phosphorescent.

8. The composition of claim 1, wherein the core further comprises a core polymer.

9. The composition of claim 8, wherein the shell polymer and the core polymer are the same.

10. The composition of claim 8, wherein the shell polymer and the core polymer are different.

11. The composition of claim 8, wherein at least one of the shell polymer and the core polymer is a block copolymer, and wherein the block copolymer is a diblock copolymer or a triblock copolymer.

12. The composition of claim 8, wherein the core polymer is present in the particle at a concentration of 7%-10%, 10%-15%, 15%-20%, 20%- 25%, 25%-30%, 30%-35%, 35%-40%, 40%-45%, 45%- 50%, 50%-55%, 55%-60%, 60%-65%, 65%-70%, 70%- 75%, 75%-80%, 80%-85%, 85%-90%, or 90%-92% w/w.

13. The composition of claim 8, wherein the coloring agent is adsorbed to, physically entrapped by, or covalently bonded to the core polymer.

14. The composition of claim 1, wherein the shell polymer comprises an aliphatic polyanhydride or an aromatic polyanhydride, wherein the aliphatic polyanhydride or the aromatic polyanhydride is poly[bis(p- carboxyphenoxy)methane)] (poly(CPM)), poly[l,3-bis(p-carboxyphenoxy)propane)] poly(CPP), poly[l,6-bis(p-carboxyphenoxy)hexane] (poly(CPH)), poly(sebacic anhydride) (poly(SA)), poly[l,4-bis(hydroxyethyl)terephthalate-alt-ethyloxyphosphate], or poly[l,4- bis(hydroxyethyl)terephthalate-alt-ethyloxyphosphate]-co-1,4- bis(hydroxyethyl)terephthalate-co-terephthalate (P(BHET-EOP/BHET), 80/20).

15. The composition of claim 1, wherein the shell polymer comprises a polyorthoester, wherein the polyorthoester (POE) is POE I, POE II, POE III, or POE IV.

16. The composition of claim 8, wherein the core polymer is bioabsorbable and biodegradable, wherein the core polymer comprises polycaprolactone (PCL), poly D-lactic acid (PDLA), poly L-lactic acid (PLLA), poly(lactic-co-glycolic acid) (PLGA), polyethylene

glycol (PEG), polyethylene glycol - diacrylate (PEGDA), polyorthoester, aliphatic polyanhydride, aromatic polyanhydride, or a block copolymer thereof.

17. The composition of claim 8, wherein the core polymer is bioabsorbable and biodegradable, wherein the core polymer comprises an aliphatic polyanhydride or an aromatic polyanhydride, wherein the aliphatic polyanhydride or the aromatic polyanhydride is poly[bis(p- carboxyphenoxy)methane)] (poly(CPM)), poly[l,3-bis(p-carboxyphenoxy)propane)] poly(CPP), poly[l,6-bis(p-carboxyphenoxy)hexane] (poly(CPH)), poly(sebacic anhydride) (poly(SA)), poly[l,4-bis(hydroxyethyl)terephthalate-alt-ethyloxyphosphate], or poly[l,4- bis(hydroxyethyl)terephthalate-alt-ethyloxyphosphate]-co-1,4- bis(hydroxyethyl)terephthalate-co-terephthalate (P(BHET-EOP/BHET), 80/20).

18. The composition of claim 8, wherein the shell polymer comprises a polyorthoester, wherein the polyorthoester (POE) is POE I, POE II, POE III, or POE IV.

19. The composition of claim 1, wherein the particle is present in the carrier solution at a concentration of from 340 mg/ml to 370 mg/ml, from 370 mg/ml to 400 mg/ml, from 400 mg/ml to 430 mg/ml, from 430 mg/ml to 450 mg/ml, from 450 mg/ml to 480 mg/ml, from 480 mg/ml to 510 mg/ml, 510 mg/ml to 540 mg/ml, 540 mg/ml to 570 mg/ml, or 570 mg/ml to 600 mg/ml.

20. The composition of claim 1, further comprising a humectant.

21. The composition of claim 1, further comprising a buffer.

22. The composition of claim 1, further comprising a surfactant.

23. The composition of claim 1, wherein the coloring agent is a color additive subject to FDA color additive regulations.

24. The composition of claim 23, wherein the coloring agent is D&C Yellow 10, D&C Orange 4, D&C Red 33, D&C Red 22, D&C Yellow 8, D&C Green 5, D&C Red 17, D&C Red 21, D&C Red 27, D&C Yellow 11, D&C Violet 2, D&C Green 6, D&C Red 30, D&C Red 31, D&C Red 28, D&C Red 7, D&C Red 6, D&C Red 34, D&C Yellow 10, D&C Red

36, D&C Green 8, D&C Yellow 10 Lake, D&C Red 21 Lake, D&C Red 33 Lake, FD&C Red 40 Lake, D&C Red 27 Lake, D&C Red 28 Lake, D&C Red 30 Lake, D&C Red 36 Lake, D&C Red 6 Lake, D&C Red 7 Lake, D&C Black 2, Ext D&C Violet 2, Ext D&C Yellow 7, FD&C Red 40, FD&C Yellow 5, FD&C Blue 1, FD&C Blue 2, FD&C Green 3, FD&C Red 4, FD&C Yellow 6, FD&C Red 3, FD&C Yellow 5 Lake, FD&C Yellow 6 Lake, or FD&C Blue 1 Lake.

25. The composition of claim 1, wherein the carrier solution is in an oil-in-water emulsion.

26. A method of cosmetically tattooing a subject, comprising intradermally administering to the subject a cosmetically effective amount of the composition of claim 1.

27. A method of cosmetically tattooing a subject, comprising intradermally administering to the subject a cosmetically effective amount of the composition of claim 8.

28. A composition for semi-permanently tattooing a subject's skin, comprising:
(i) a particle and (ii) a carrier solution, wherein:

the particle comprises:

(a) a polymer that is bioabsorbable, biodegradable, and present in an amount that is effective to induce aggregation of the particle upon incorporation into a subject's skin, wherein the polymer comprises poly D-lactic acid (PDLA), poly L-lactic acid (PLLA), poly(lactic-co-glycolic acid) (PLGA), or polyethylene glycol (PEG); and

(b) a coloring agent having a molecular weight of 5 to $10x10^6$ Daltons;

wherein the particle is present in the carrier solution at a concentration of 5% w/v to 60% w/v of the carrier solution.

29. The composition of claim 28, wherein the composition is useful as a semi-permanent tattoo ink which retains its vibrancy for 2 months to 12 months.

30. The composition of claim 28, wherein the particle is present in the carrier solution at a concentration of 340 mg/ml to 600 mg/ml.

31. The composition of claim 28, wherein the particle is present in the carrier solution at a concentration of from 340 mg/ml to 370 mg/ml, from 370 mg/ml to 400 mg/ml, from 400 mg/ml to 430 mg/ml, from 430 mg/ml to 450 mg/ml, from 450 mg/ml to 480 mg/ml, from 480 mg/ml to 510 mg/ml, 510 mg/ml to 540 mg/ml, 540 mg/ml to 570 mg/ml, or 570 mg/ml to 600 mg/ml.

32. The composition of claim 28, wherein the particle has an average diameter of less than 100 μm.

33. The composition of claim 28, further comprising a humectant.

34. The composition of claim 28, further comprising a buffer.

35. The composition of claim 28, further comprising a surfactant.

36. The composition of claim 28, wherein the coloring agent is a color additive subject to FDA color additive regulations.

37. The composition of claim 36, wherein the coloring agent is D&C Yellow 10, D&C Orange 4, D&C Red 33, D&C Red 22, D&C Yellow 8, D&C Green 5, D&C Red 17, D&C Red 21, D&C Red 27, D&C Yellow 11, D&C Violet 2, D&C Green 6, D&C Red 30, D&C Red 31, D&C Red 28, D&C Red 7, D&C Red 6, D&C Red 34, D&C Yellow 10, D&C Red 36, D&C Green 8, D&C Yellow 10 Lake, D&C Red 21 Lake, D&C Red 33 Lake, FD&C Red 40 Lake, D&C Red 27 Lake, D&C Red 28 Lake, D&C Red 30 Lake, D&C Red 36 Lake, D&C Red 6 Lake, D&C Red 7 Lake, D&C Black 2, Ext D&C Violet 2, Ext D&C Yellow 7, FD&C Red 40, FD&C Yellow 5, FD&C Blue 1, FD&C Blue 2, FD&C Green 3, FD&C Red 4, FD&C Yellow 6, FD&C Red 3, FD&C Yellow 5 Lake, FD&C Yellow 6 Lake, or FD&C Blue 1 Lake.

38. The composition of claim 28, the composition being configured such that at least one of a bioabsorption profile or a biodegradation profile exhibits a lag phase of 2 months to 12 months.

39. The composition of claim 28, wherein the coloring agent is a dye, is a pigment, is fluorescent, or is phosphorescent.

40. The composition of claim 28, wherein the carrier solution is in an oil-in-water emulsion.

41. A method of cosmetically tattooing a subject, comprising intradermally administering to the subject a cosmetically effective amount of the composition of claim 28.

42. The method of claim 26, wherein the tattooing provides a tattoo that partially or fully changes color.

43. The method of claim 27, wherein the tattooing provides a tattoo that partially or fully changes color.

44. The method of claim 41, wherein the tattooing provides a tattoo that partially or fully changes color.

45. The method of claim 42, wherein the tattoo partially or fully changes color as the particle degrades.

46. The method of claim 43, wherein the tattoo partially or fully changes color as the particle degrades.

47. The method of claim 44, wherein the tattoo partially or fully changes color as the particle degrades.

48. The composition of claim 1, wherein the particle is one of a plurality of particles and the shell polymer is present in an amount that is sufficient to prevent or inhibit phagocytosis of the coloring agent upon incorporation into a subject’s dermis.

49. The composition of claim 28, wherein the particle is one of a plurality of particles and the polymer is present in an amount that is sufficient to prevent or inhibit phagocytosis of the coloring agent upon incorporation into a subject's dermis.