

What is claimed is:

1. A graft copolymer polyelectrolyte complex comprising:

(1) an anionic graft copolymer comprising:

- (i) a backbone comprising a poly(alkylacrylic acid); and
- (ii) one or more polyetheramine pendent chains covalently attached to said copolymer backbone as amides of the acrylic acid groups, wherein said pendent chains predominantly comprise ethylene oxide repeating units;

wherein said copolymer has a graft density between about 0.1 and about 25 mole percent;

(2) one or more anionic, cationic or polyelectrolyte therapeutic agents; and

(3) optionally, a liposome which optionally comprises an additional therapeutic agent;

wherein when said therapeutic agent is a polynucleotide molecule, a liposome comprising said additional therapeutic agent is also present.

2. The complex of claim **1**, wherein the copolymer backbone comprises poly(propyl acrylic acid) or poly(methacrylic acid).

3. The complex of claim **1**, wherein said copolymer has a graft density between about 0.5 and about 5 mole percent.

4. The complex of claim **1**, wherein said liposome is present.

5. The complex of claim **1**, wherein said pendent chains further comprise one or more ligands that target a specific cell, tissue or surface.

6. The complex of claim **5**, wherein one or more of said ligands target a microbial biofilm or a planktonic microbe.

7. The complex of claim **5**, wherein one or more of said ligands comprises a phosphonate molecule that targets bone tissue.

8. The complex of claim **1**, wherein said anionic, cationic or polyelectrolyte therapeutic agent is selected from the group consisting of cationic peptides, peptide nucleic acids, aminoglycoside antibiotics, glycopeptide antibiotics, lipopeptide antibiotics, aminoamide local anesthetics, aminoester local anesthetics, oligonucleotides, nucleic acids, plasmid DNA-encoding genes, and ribozymes.

9. The complex of claim **8**, wherein said aminoglycoside antibiotic is selected from the group consisting of neomycin, gentamicin and tobramycin.

10. The complex of claim **8**, wherein said glycopeptide antibiotic is selected from the group consisting of vancomycin and telavancin.

11. The complex of claim **8**, wherein said lipopeptide antibiotic is daptomicin.

12. The complex of claim **8**, wherein said aminoamide local anesthetics and aminoester local anesthetics are selected from the group consisting of mepivacaine, lidocaine, bupivacaine, benzocaine and procaine.

13. The complex of claim **1**, wherein said additional therapeutic agent is selected from the group consisting of small molecule therapeutic agents, imaging agents, fluorescent dyes and quantum dots.

14. The complex of claim **13**, wherein said small molecule therapeutic agents are selected from the group consisting of

anticancer agents, wound healing agents, tissue regeneration agents, other antibiotic agents, and pain control agents.

15. The complex of claim **1**, wherein said therapeutic agent comprises a cationic peptide.

16. The complex of claim **15**, wherein said cationic peptide comprises a compound selected from the group consisting of KSL-W, colistin and polymyxin B.

17. The complex of claim **1**, wherein said anionic, cationic or polyelectrolyte therapeutic agent is stabilized toward biological degradation in vivo.

18. A functional nanoparticle comprising the complex of claim **1**, wherein said nanoparticle provides in vivo delivery of the anionic, cationic or polyelectrolyte therapeutic agent.

19. A method of preparing a graft copolymer-polyelectrolyte complex comprising the steps of:

(1) providing an aqueous mixture of an anionic graft copolymer comprising:

- (i) a backbone comprising a poly(alkyl acrylic acid); and
- (ii) one or more polyetheramine pendent chains covalently attached to said copolymer backbone as amides of the acrylic acid groups, wherein said pendent chains predominantly comprise ethylene oxide repeating units;

wherein said copolymer has a graft density between about 0.1 and about 25 mole percent;

(2) adding one or more polyelectrolytes to form a polyelectrolyte-copolymer mixture;

(3) optionally adding an aqueous mixture containing a liposome which optionally comprises an additional therapeutic agent, to form a liposome-containing polyelectrolyte-copolymer mixture; and

(4) allowing said polyelectrolyte-copolymer mixture or said liposome-containing polyelectrolyte-copolymer mixture to self-assemble in the aqueous medium to form said complex, which further forms nanoparticles.

20. A method of treating a patient in need thereof with a polyelectrolyte therapeutic agent comprising the steps of:

(1) formulating the complex or the nanoparticle of any of claim **1** with one or more pharmaceutically acceptable carriers to provide a pharmaceutical composition; and

(2) administering said pharmaceutical composition to said patient in an amount effective to treat said patient.

21. The method of claim **20**, wherein said anionic, cationic or polyelectrolyte therapeutic agent is selected from the group consisting of antibacterial agents, anticancer agents, wound treatment agents and tissue regeneration agents.

22. The method of claim **20**, wherein the administration is via oral, enteral, parenteral or topical delivery.

23. The method of claim **20**, wherein said pharmaceutical composition is selected from the group consisting of injectable aqueous solutions, injectable aqueous dispersions, emulsions, gels, pastes, aerosols, sprays, coatings, hydrogels, topical creams, topical ointments, natural and synthetic polymeric fibers, porous ceramics, polymeric and ceramic composites, and wound treatment compositions.

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