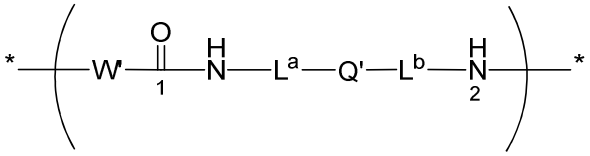
CLAIMS

What is claimed is:

1. A cationic polymer, comprising:

a cationic repeat unit of formula (1):



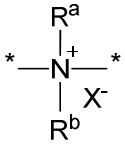
(1),

wherein

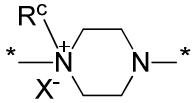
W' is a single bond or a divalent linking group having a structure *-C(=O)-L'-*, wherein L' is divalent radical comprising 1-20 carbons and L' is linked to carbon 1,

L^a and L^b are independent divalent hydrocarbon groups comprising 2-20 carbons, and

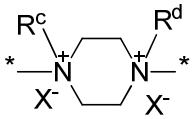
Q' is a divalent radical comprising a positive-charged quaternary nitrogen which is covalently bonded to 4 carbons, wherein Q' is selected from the group consisting of



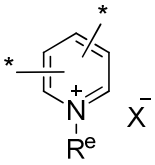
(4),



(5),



(6), and



(7),

wherein R^a, R^b, R^c, R^d, R^e are independent monovalent hydrocarbon groups comprising 1-20 carbons, and each X^- is an independent negative-charged counterion, and

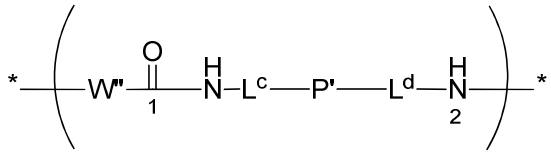
adjacent repeat units of the cationic polymer are covalently linked in a head-to-tail arrangement, wherein nitrogen labeled 2 is designated a tail and W' is designated a head.

2. The cationic polymer of claim 1, wherein L' is selected from the group consisting of methylene, 1,2-ethylene, 1,1-ethylene, 1,3-propylene, 1,1-propylene, 1,4-butylene, 1,1-butylene, 1,5-pentylene, and 1,1-pentylene.

3. The cationic polymer of claim 1 or 2, wherein R^a is methyl and R^b is benzyl.

4. The cationic polymer of claim 1 or 2, wherein R^c, R^d, and R^e are independently selected from the group consisting of methyl and benzyl.

5. The cationic polymer of claim 1, wherein the cationic polymer comprises a random distribution of i) the cationic repeating units of formula (I) and ii) a polymeric repeat unit of formula (8):



(8),

wherein

nitrogen labeled 2 is designated a tail,

W" is designated a head,

W" is a single bond or a divalent linking group having a structure *-C(=O)-L"-*, wherein L" is divalent radical comprising 1-20 carbons and L" is linked to carbonyl carbon 1,

L^c and L^d are independent divalent linking groups selected from the group consisting of a single bond, and hydrocarbon groups comprising 1-6 carbons, and

P' is a divalent poly(alkylene oxide) chain.

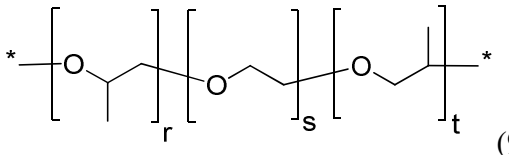
6. The cationic polymer of claim 5, wherein P' is a block copolymer chain comprising a poly(propylene oxide) block and a poly(ethylene oxide) block.

7. The cationic polymer of claim 5, wherein the cationic polymer comprises the polymeric repeating units in an amount of more than 0 mol% to 10 mol% based on total moles of repeating units of the cationic polymer.

8. The cationic polymer of claim 5, wherein the cationic polymer comprises the polymeric repeating units in an amount of 2.5 mol% to 10 mol% based on total moles of repeating units of the cationic polymer.

9. The cationic polymer of claim 5, wherein L" is selected from the group consisting of methylene, 1,2-ethylene, 1,1-ethylene, 1,3-propylene, 1,1-propylene, 1,4-butylene, 1,1-butylene, 1,5-pentylene, and 1,1-pentylene.

10. The cationic polymer of claim 5, wherein P' is a triblock copolymer having a structure according to formula (9):



(9),

wherein

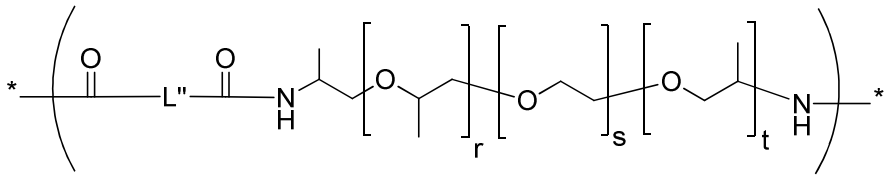
r, s, and t represent degrees of polymerization of respective blocks of alkylene oxide repeat units enclosed in the brackets,

r, s, and t independently have average values greater than 1.

11. The cationic polymer of claim 5, wherein P' has a number average molecular weight (Mn) of 500 to 5000 or

1500 to 2500.

12. The cationic polymer of claim 5, wherein the polymeric repeat units have structures in accordance with formula (10):



(10),

wherein

L" is a divalent group comprising 1-20 carbons,

r, s, and t represent average numbers of respective alkylene oxide repeat units, and

r, s, and t independently have average values greater than 1.

13. The cationic polymer of claim 12, wherein s/(r+t) has a value of 2 to 12.

14. A non-therapeutic method of killing a microbe, comprising contacting the microbe with the cationic polymer of claim 1.

15. The method of claim 14, where the microbe is selected from the group consisting of Gram-positive microbes, Gram-negative microbes, fungi, and combinations thereof.

16. An antimicrobial composition comprising the cationic polymer of claim 1 and at least one other chemical component.

17. The antimicrobial composition of claim 16, wherein the antimicrobial composition is selected from the group consisting of soaps, shampoos, skin lotions, skin creams, cosmetics, mouthwashes, wound care agents, deodorants, surface cleaning agents, and laundry detergents.

18. The antimicrobial composition of claim 16, wherein the antimicrobial composition is toxic to a microbe selected from the group consisting of Gram-positive microbes, Gram-negative microbes, fungi, and combinations thereof.