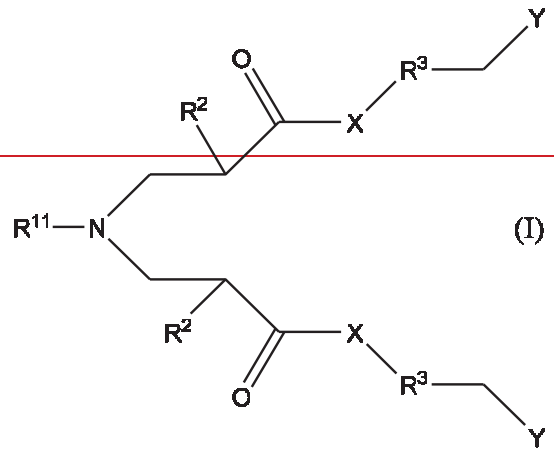
What is claimed is:

1. A compound according to Formula I



(I)

Wherein:

X is NH or O;

R^{11} is R^1 or R^1-Z-$(CH_2)_m$-;

R^1 is an unsubstituted or substituted, linear or branched C_1-C_{30} alkyl, cyclic alkyl, alkenyl, or alkynyl group;

Z is NH or O;

R^2 is H, CH_3, or an unsubstituted, linear or branched C_2-C_{10} alkyl, alkenyl, or alkynyl group;

m is an integer of 1 to 4;

R^3 is absent or an unsubstituted, linear C_1-C_{30} alkylene group;

Y is $NR_4R_5R_6^{(+)}$, or a salt thereof; and

R^4, R^5, and R^6 are independently a C_1-C_{10} alkyl group.

2. The compound according to claim 1, wherein X is NH.

3. The compound according to claim 1, wherein X is O.

4. The compound according to any one of claims 1 to 3, wherein R^{11} is R^1.

5. The compound according to any one of claims 1 to 3, wherein R^{11} is R^1-Z-$(CH_2)_m$-.

6. The compound according to any one of claims 1 to 3, wherein R^{11} is R^1-Z-$(CH_2)_m$-, and Z is NH.

7. The compound according to any one of claims 1 to 3, wherein R^{11} is R^1-Z-$(CH_2)_m$-, and Z is O.

8. The compound according to any one of claims 1 to 3, wherein R^{11} is R^1-Z-$(CH_2)_m$-, Z is NH, and m is 2.

9. The compound according to any one of claims 1 to 8, wherein R^2 is H.

10. The compound according to any one of claims 1 to 8, wherein R^2 is CH_3.

11. The compound according to any one of claims 1 to 10, wherein Y is $-NR_4R_5R_6^{(+)}$.

12. The compound according to any one of claims 1 to 10, wherein Y is $-NR^4R^5R^{6(+)}$, and R^4, R^5, and R^6 are independently CH_3.

13. The compound according to any one of claims 1 to 10, wherein Y is $-NR^4R^5R^{6(+)}$, R^4 and R^5 are independently CH_3, and R^6 is a C_2-C_{12} aromatic-alkyl.

14. The compound according to any one of claims 1 to 13, wherein Y is $-NR^4R^5R^{6(+)}$, R^4 and R^5 are independently CH_3, and R^6 is $-CH_2$-C_6H_6.

15. The compound according to any one of claims 1 to 14, wherein Y is $-NR^4R^5R^{6(+)}$ and the counter ion for Y is chloride, bromide, fluoride, iodide, acetate, aluminate, cyanate, cyanide, dihydrogen phosphate, dihydrogen phosphite, formate, carbonate, hydrogen carbonate, hydrogen oxalate, hydrogen sulfate, hydroxide, nitrate, nitrite, thiocyanate, or a combination thereof.

19. The compound according to any one of claims 1 to 18, wherein R^3 is CH_2.

20. The compound according to any one of claims 1 to 18, wherein R^3 is CH_2CH_2 or $C(CH_3)_2$.

21. The compound according to any one of claims 1 to 18, wherein R^3 is an unsubstituted, linear, and saturated C_2-C_{10} alkylene group.

22. The compound according to any one of claims 1 to 18, wherein R^3 is an unsubstituted, linear, and unsaturated C_2-C_{10} alkylene group.

23. The compound according to any one of claims 1 to 22, wherein R^1 is a linear C_1-C_{30} alkyl, alkenyl, or alkynyl group.

24. The compound according to any one of claims 1 to 22, wherein R^1 is a branched C_3-C_{30} alkyl, alkenyl, or alkynyl group.

25. The compound according to any one of claims 1 to 22, wherein R^1 is a linear saturated C_1-C_{30} alkyl group.

26. The compound according to any one of claims 1 to 22, wherein R^1 is a

branched saturated C_1-C_{30} alkyl group.

27. The compound according to any one of claims 1 to 22, wherein R^1 is a linear C_1-C_{30} alkenyl group with one or more double bonds.

28. The compound according to any one of claims 1 to 22, wherein R^1 is a branched C_3-C_{30} alkenyl group with one or more double bonds.

29. The compound according to any one of claims 1 to 22, wherein R^1 is a linear C_2-C_{30} alkynyl group with one or more triple bonds.

30. The compound according to any one of claims 1 to 22, wherein R^1 is a branched C_2-C_{30} alkynyl group with one or more triple bonds.

31. The compound according to any one of claims 1 to 30, wherein R^{11} is a linear and saturated C_2-C_{20} alkyl group.

32. The compound according to any one of claims 1 to 30, wherein R^{11} is a C_2-C_{20} alkenyl group with at least one *trans* double bond.

33. The compound according to any one of claims 1 to 30, wherein R^{11} is a C_2-C_{20} alkenyl group with at least one *cis* double bond.

34. The compound according to any one of claims 1 to 30, wherein R^{11} is R^1-NH-$CH_2CH_2CH_2$ group and R^1 is a linear saturated C_2-C_{20} alkyl, trans alkenyl, or a cis alkenyl group.

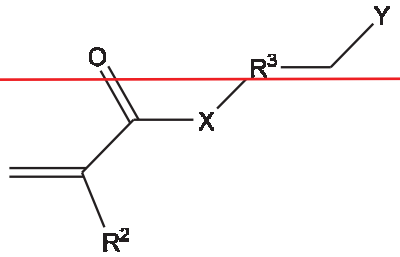
35. The compound according to any one of claims 1-34, wherein R^2 is H, X is NH, R^3 is CH_2CH_2, and Y is CH_2-$N^+(CH_3)_3Cl^-$.

36. A method to synthesize a compound comprising:

contacting a primary amine with an activated olefin to generate the compound of any one of claims 1 to 35;

wherein the primary amine is R^{11}-NH_2, wherein R^{11} is R^1 or R^1-Z-$(CH_2)_m$-; and

wherein the activated olefin is



X is NH or O;

R^{11} is R^1 or R^1-Z-$(CH_2)_m$-;

R^1 is an unsubstituted or substituted, linear or branched C_1-C_{30} alkyl, cyclic alkyl, alkenyl, or alkynyl group;

Z is NH or O;

R^2 is H, CH_3, or an unsubstituted, linear or branched C_2-C_{10} alkyl, alkenyl, or alkynyl group;

m is an integer of 1 to 4;

R^3 is absent or an unsubstituted, linear C_1-C_{30} alkylene group;

Y is $NR^4R^5R^{6(+)}$, or a salt thereof; and

R^4, R^5, and R^6 are independently a C_1-C_{10} alkyl group.

37. The method of claim 36, wherein the contacting step is done in the presence of a reaction solvent, of a reaction solvent and alkalinity source, of a reaction solvent and acid, or of a reaction solvent and a catalyst.

38. The method of claim 37, wherein the reaction solvent is water, methanol, ethanol, propanol, glycol, PEG, or a mixture thereof.

39. The method of claim 37, wherein the reaction solvent is water.

40. The method according to any one of claims 37 to 39, wherein the contacting step is done in the presence of a catalyst, base, or a combination thereof.

41. The method according to any one of claims 37 to 39, wherein the contacting step is done without the presence of a catalyst, base, or acid.

42. The method according to any one of claims 37 to 39, wherein the contacting step is done in the presence of a base.

43. The method according to any one of claims 37 to 39, wherein the contacting step

~~is done without a base, acid, or catalyst.~~

~~44. The method according to any one of claims 37 to 40, wherein the contacting step is done in the presence of a hydroxide, alkali metal hydroxide, alkaline metal hydroxide, metal carbonate, imidazole, pyridine based base, amidine base, guanidine base, or combinations thereof.~~

~~45. The method according to any one of claims 37 to 39, wherein the contacting step is done in the presence of benzyltrimethylammonium hydroxide.~~

~~46. An article, product, or composition comprising one or more compounds of any one of claims 1-45.~~

~~47. The article, product, or composition of claim 46, wherein the article, product or composition further comprises a carrier solvent.~~

~~48. The article, product, or composition of any one of claims 46-47, wherein the article, product or composition further comprise water.~~

~~49. The article, product, or composition of any one of claims 46-47, wherein the carrier solvent is water, an alcohol, an alkylene glycol, an alkyleneglycol alkyl ether, or a combination thereof.~~

~~50. The article, product, or composition of any one of claims 46-48, wherein the carrier solvent is methanol, ethanol, propanol, isopropanol, butanol, isobutanol, monoethyleneglycol, ethyleneglycol monobutyl ether, or a combination thereof.~~

~~51. The article, product, or composition of any one of claims 46-50, wherein the article, product or composition further comprises a primary alkalinity source and is a detergent composition.~~

~~52. The article, product, or composition of claim 51, wherein the primary alkalinity source is an alkali metal hydroxide, alkali metal carbonate, alkali metal silicate, alkali metal metasilicate, alkanoamine, amine, or mixture thereof.~~

~~53. The article, product, or composition of claim 51, wherein the primary alkalinity source is an alkali metal hydroxide, alkali metal carbonate, or mixture thereof.~~

~~54. The article, product, or composition of claim 51, wherein the primary alkalinity source is an alkali metal carbonate.~~

~~55. The article, product, or composition of any one of claims 51-54, wherein the article, product, or composition further comprises a builder.~~

~~56. The article, product, or composition of any one of claims 51-55, wherein the~~

~~article, product, or composition further comprises an enzyme.~~

~~57. The article, product, or composition of claim 56, wherein the enzyme is a protease enzyme.~~

~~58. The article, product, or composition of any one of claims 51-57, wherein the article, product, or composition further comprises chelant.~~

~~59. The article, product, or composition of claim 58, wherein the chelant is methylglycinediacetic acid (MGDA), glutamic acid-N,N-diacetic acid (GLDA), N-hydroxyethylaminodiacetic acid, ethylenediaminetetraacetic acid (EDTA), hydroxyethylenediaminetetraacetic acid, diethylenetriaminepentaacetic acid, N-hydroxyethyl-ethylenediaminetriacetic acid (HEDTA), diethylenetriaminepentaacetic acid (DTPA), ethylenediaminesuccinic acid (EDDS), 2-hydroxyethyliminodiacetic acid mixture thereof.~~

~~60. The article, product, or composition of any one of claims 51-59, wherein the article, product, or composition further comprises one or more additional detergent composition agents.~~

~~61. The article, product, or composition of any one of claims 46-60, wherein the article, product, or composition further comprises a surfactant.~~

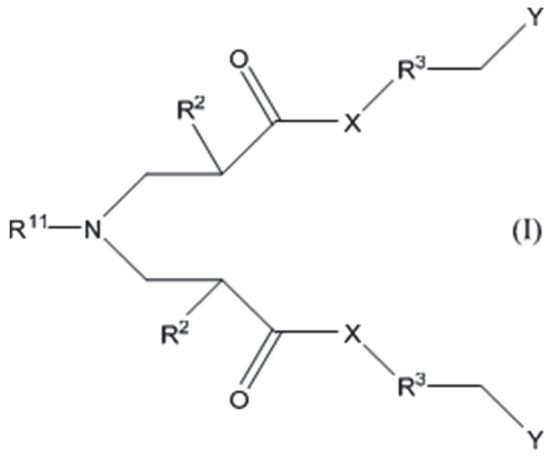
~~62. The article, product, or composition of claim 60, wherein the surfactant is a nonionic, semi-nonionic, cationic, anionic, amphoteric, zwitterionic, Gemini, surfactant or mixtures thereof.~~

~~63. The article, product, or composition of any one of claims 51-63, wherein the composition is a solid, a multiple use solid, or multiple use pressed solid composition.~~

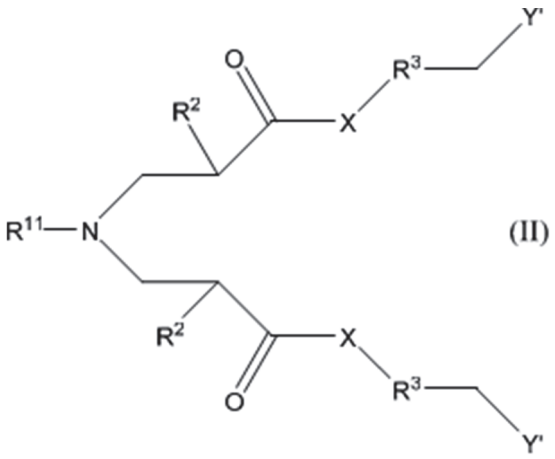
~~64~~1. A method of for inhibiting corrosion at a surface in a water system comprising:

providing a corrosion control composition or a use solution of the corrosion control composition into a water system to generate a treated water system or onto to a surface of the water system,

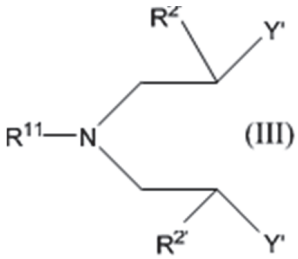
wherein the corrosion control composition comprises one or more compounds according to one of Formula I, Formula II, Formula III and one or more additional corrosion control composition agents,



(I)



(II)



(III)

wherein:

X is NH or O;

R^{11} is R^1 or R^1-Z-$(CH_2)_m$-;

R^1 is an unsubstituted or substituted, linear or branched C_5-C_{30} alkyl, cyclic alkyl, alkenyl, or alkynyl group;

Z is NH or O;

R^2 is H, CH_3, or an unsubstituted, linear or branched C_2-C_{10} alkyl, alkenyl, or alkynyl group;

m is an integer of 1 to 4;

R^3 is absent or an unsubstituted, linear C_1-C_{30} alkylene group;

Y is $-NR_4R_5R_6^{(+)}$;

Y' is -COOH, $-SO_3H$, $-PO_3H$, $-OSO_3H$, $-OPO_3H$, or a salt thereof; and

R^4, R^5, and R^6 are independently a C_1-C_{10} alkyl group;

$R^{2'}$ is H, CH_3, or an unsubstituted or substituted, linear or branched C_1-C_{10} alkyl, alkenyl, alkynyl group, -COOH, $-CH_2COOH$, Y', or $-(CH_2)_m$-Y' and

wherein the corrosion control composition mitigates corrosion on the surface in the water system.

~~65. The method according to claim 64, wherein X is NH.~~

~~66. The method according to claim 64, wherein X is O.~~

~~67. The method according to any one of claims 64-66, wherein R^{11} is R^1 and R^1 is a linear C_5-C_{30} alkyl, alkenyl, or alkynyl group.~~

~~68. The method according to any one of claims 64-67, wherein R^{11} is R^1-Z-$(CH_2)_m$- or R^1-Z-$(CH_2)_2$-, Z is NH, and R^1 is a linear C_5-C_{30} alkyl, alkenyl, or alkynyl group.~~

~~69. The method according to any one of claims 64-67, wherein R^{11} is R^1-Z-$(CH_2)_m$-, Z is O, and R^1 is a linear C_5-C_{30} alkyl, alkenyl, or alkynyl group.~~

~~70. The method according to any one of claims 64-69, wherein R^2 is H or CH_3.~~

~~71~~2. The method according to ~~any one of claims 64-70~~claim 1, wherein Y is $-NR^4R^5R^{6(+)}$,

$N(CH_3)_3^+$, or $N(CH_3)_2R_6^+$, and wherein R^6 is a C_2-C_{12} alkyl. aryl, or is -CH_2-C_6H_6.

~~72~~3. The method according to any one of claims ~~64~~1-~~71~~2, wherein R^3 is CH_2, CH_2CH_2, or $C(CH_3)_2$, or an unsubstituted and linear C_2-C_{10} alkylene group.

~~73~~4. The method according to any one of claims ~~64~~1-~~72~~3, wherein R^{11} is a C_6-C_{20} alkenyl group with at least one *trans* or *cis* double bond.

~~74~~5. The method according to any one of claims ~~64~~1-~~47~~3, wherein the corrosion control composition agent is ~~a carrier, wherein the carrier is~~ water, an organic solvent, a surfactant~~or a mixture thereof~~.

~~75. The method according to any one of claims 64-74, wherein the corrosion control composition agent is a carrier and~~ one or more additional corrosion inhibitors, a scale inhibitor, gas hydrate inhibitor, pH modifier, an emulsion breaker, reverse emulsion breaker, a fouling control agent, coagulant/flocculant agent, an emulsifier, a water clarifier, a dispersant, antioxidant, polymer degradation prevention agent, permeability modifier, foaming agent, antifoaming agent, emulsifying agent, scavenger agent for CO_2, and/or O_2, gelling agent, lubricant, friction reducing agent, salt, or any mixture thereof.

~~766~~. The method according to any one of claims ~~641~~-~~755~~, wherein the corrosion control composition agent is a biocide, wherein the biocide is chlorine, hypochlorite, ClO_2, bromine, ozone, hydrogen peroxide, peracetic acid, peroxysulphate, peroxycarboxylic acid composition, glutaraldehyde, dibromonitrilopropionamide, isothiazolone, terbutylazine, polymeric biguanide, methylene bisthiocyanate,
tetrakis hydroxymethyl phosphonium sulphate, or any combination thereof.

~~777~~. The method according to any one of claims ~~641~~-~~765~~, wherein the corrosion control composition agent is an acid and wherein the corrosion control composition comprises from about 1 wt-% to about 20 wt-% of the acid, wherein the acid is hydrochloric acid, hydrofluoric acid, citric acid, formic acid, acetic acid, or a
mixture thereof.

~~78. The method according to any one of claims 64-77, wherein the corrosion control composition agent is a surfactant.~~

~~79. The method according to any one of claims 64-78, wherein the corrosion control composition agent is a scale inhibitor, gas hydrate inhibitor, pH modifier, or any combination thereof.~~

~~80. The method according to any one of claims 64-79, wherein the corrosion control composition agent is an emulsion breaker, reverse emulsion breaker, a fouling control agent, coagulant/flocculant agent, an emulsifier, a water clarifier, a dispersant, antioxidant, polymer degradation prevention agent, permeability modifier, foaming agent, antifoaming agent, emulsifying agent, scavenger agent for CO_2, and/or O_2, gelling agent, lubricant, friction reducing agent, salt, or mixture thereof.~~

818. The method according to any one of claims 641-807, wherein the corrosion control composition is a liquid, gel, or a mixture comprising liquid/gel and solid, and wherein the corrosion control composition or a use solution thereof has a pH of from about 1 to about 11.

~~82. The method according to any one of claims 64-81, wherein the corrosion control composition or a use solution thereof has a pH of from about 1 to about 11.~~

839. The method according to any one of claims 641-828, wherein the corrosion control composition comprises from about 10 wt-% to about 80 wt-% of the compound and has a concentration of from about 1 ppm to about 1000 ppm in the treated water system.

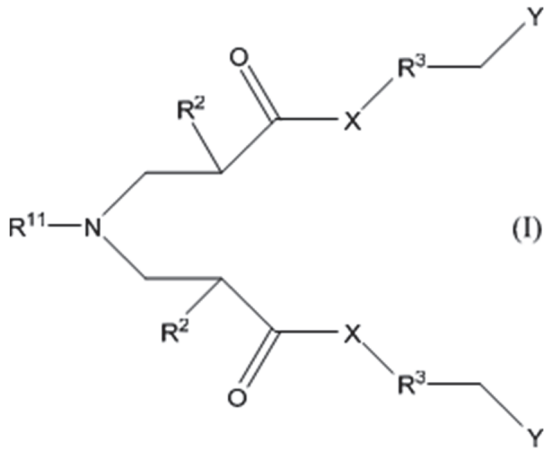
~~84. The method according to any one of claims 64-83, wherein the compound has a concentration of from about 1 ppm to about 1000 ppm in the treated water system.~~

~~85. The method according to any one of claims 64-84, wherein the water system comprises fresh water, recycled water, salt water, surface water, produced water, oil, hydrocarbon, solid, or mixture thereof.~~

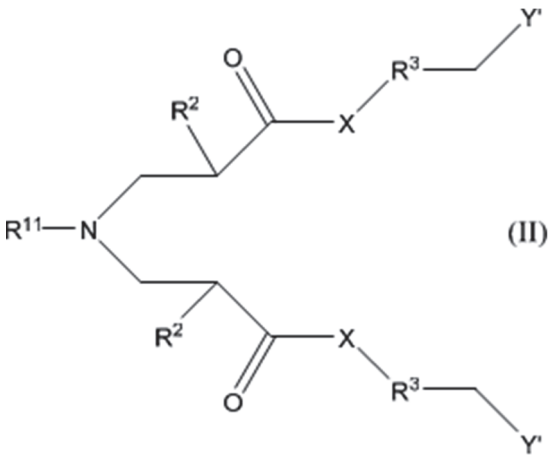
8610. The method according to any one of claims 641-859, wherein the water system is a cooling water system, boiler water system, water system in oil and gas operations, in a petroleum well, downhole formation, geothermal well, mineral washing,

flotation and benefaction, papermaking, gas scrubber, air washer, continuous casting processes in the metallurgical industry, air conditioning and refrigeration, water reclamation, water purification, membrane filtration, food processing, clarifiers, municipal sewage treatment, municipal water treatment, or potable water system, and wherein the water system comprises fresh water, recycled water, salt water, surface water, produced water, oil, hydrocarbon, solid, or mixture thereof.

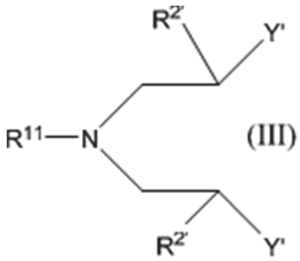
8711. A corrosion control composition comprising one or more compounds according to one of Formula **I**, Formula **II**, and Formula **III** and one or more additional corrosion control composition agents,



(I)



(II)



(III)

wherein:

X is NH or O;

R^{11} is R^1 or R^1-Z-$(CH_2)_m$-;

R^1 is an unsubstituted or substituted, linear or branched C_5-C_{30} alkyl, cyclic alkyl, alkenyl, or alkynyl group;

Z is NH or O;

R^2 is H, CH_3, or an unsubstituted, linear or branched C_2-C_{10} alkyl, alkenyl, or alkynyl group;

m is an integer of 1 to 4;

R^3 is absent or an unsubstituted, linear C_1-C_{30} alkylene group;

Y is $-NR_4R_5R_6^{(+)}$;

Y' is -COOH, $-SO_3H$, $-PO_3H$, $-OSO_3H$, $-OPO_3H$, or a salt thereof;

R^4, R^5, and R^6 are independently a C_1-C_{10} alkyl group;

$R^{2'}$ is H, CH_3, or an unsubstituted or substituted, linear or branched C_1-C_{10} alkyl, alkenyl, alkynyl group, -COOH, $-CH_2COOH$, Y', or $-(CH_2)_m$-Y', and

wherein the corrosion control composition mitigates corrosion on the surface in the water system.