What is claimed is:

1. A silicon-containing polymeric structure coated/encapsulated active ingredient comprising:
   (i) a solid active ingredient having an outer surface;
   (ii) a surfactant applied to the outer surface; and
   (iii) silicon-containing polymeric structure applied to the surfactant such that the silica at least partially surrounds the active ingredient.

2. The silicon-containing polymeric structure coated/encapsulated active ingredient according to claim 1, wherein the active ingredient comprises pyrithione compounds, basic copper carbonate, isothiazolinone compounds, substituted triazines, carbamates, chlorinated aromatic ureas, triazoles and combinations thereof.

3. The silicon-containing polymeric structure coated/encapsulated active ingredient according to claim 1, wherein the active ingredient comprises a metal pyrithione.

4. The silicon-containing polymeric structure coated/encapsulated pyrithione compound according to claim 3, wherein the metal is selected from the group consisting of zinc, copper and zirconium.

5. The silicon-containing polymeric structure coated/encapsulated pyrithione compound according to claim 3, wherein the silicon-containing polymeric structure comprises pores therein.

6. An antimicrobial polymer composition comprising a polymer matrix having a silicon-containing polymeric structure coated/encapsulated pyrithione compound according to claim 1 dispersed in the polymer matrix.

7. The antimicrobial polymer composition according to claim 6, wherein the polymer matrix comprises a chlorine containing polymer.

8. The antimicrobial polymer composition according to 7, wherein the polymer matrix comprises polyvinylchloride.

9. The antimicrobial polymer composition according to claim 6, wherein the polymer matrix comprises a polyurethane.

10. A molded article comprising the antimicrobial polymer composition according to claim 6.

11. The foam comprising the antimicrobial polymer composition according to claim 9.

12. A coating composition for coating a substrate, wherein the composition comprises the silicon-containing polymeric structure coated/encapsulated pyrithione according to claim 6.

13. A method of preparing a silicon-containing polymeric structure coated/encapsulated active ingredient, said method comprising:
    (i) providing a solid water-insoluble active ingredient;
    (ii) dispersing the active ingredient in a liquid medium in which the active ingredient is insoluble to form a suspension of the active ingredient;
    (iii) adding a silicon-containing precursor for the polymeric structure to the suspension; and
    (iv) reacting the silicon-containing precursor to form the silicon-containing polymeric structure, wherein the silicon-containing polymeric structure is formed around the active ingredient, thereby forming a silicon-containing polymeric structure coated/encapsulated active ingredient.

14. The method according to claim 13, wherein said dispersing comprises mixing the active ingredient with a dispersant and water to form a mixture and mixing the mixture for a period of time to form a suspension the active ingredient in water.

15. The method according to claim 14, wherein said mixing comprises, low shear mixing, high shear mixing or sonication.

16. The method according to claim 13, further comprising adjusting the pH of the suspension of the active ingredient to a pH within a range of about 2 to about 12.

17. The method according to claim 16, wherein the pH is adjusted to a range of about 3 to about 6.

18. The method according to claim 16, wherein the pH is adjusted to a range of about 8 to about 12.

19. The method according to claim 13, wherein the active ingredient comprises a pyrithione compound.

20. The method according to claim 19, wherein the pyrithione compound comprises a metal pyrithione compound.

21. The method according to claim 20, wherein the metal of the metal pyrithione compound comprises zinc, copper, or zirconium.

22. The method according to claim 13, wherein the silicon-containing precursor comprises a silica precursor comprising silanes of the formula (I):

$Si(Y)_m(X)_n$ (I)

wherein Y is a hydrolysable substituent and X is a substituent which is not reactive with the hydrolysable substituent during the polymerization reaction; m is an integer from 2-4; n is an integer of 0-2; wherein m+n=4; and wherein the average value of m is at least three.

23. The method according to claim 13, further comprising isolating the silicon-containing polymeric structure coated/encapsulated active ingredient compound from the water.

24. The method according to claim 23, wherein the silicon-containing polymeric structure coated/encapsulated active ingredient is in powder form.

25. The method according to claim 13, wherein the active ingredient comprises zinc pyrithione, said dispersing comprises mixing the zinc pyrithione with a dispersant and water to form a mixture and mixing the mixture for a period of time to form a suspension the pyrithione compound in water; said mixing comprises, low shear mixing, high shear mixing or sonication.

26. The method according to claim 13, wherein the dispersant is cationic, anionic or neutral dispersant.

27. A silicon-containing polymeric structure coated/encapsulated active ingredient prepared by the process of any one of claims 13-26.

What is claimed is:

1. A silicon-containing polymeric structure coated/encapsulated active ingredient comprising:
   (i) a solid active ingredient having an outer surface selected from pyrithione compounds, basic copper carbonate, isothiazolinone compounds, substituted triazines, carbamates, triazoles and combinations thereof;
   (ii) a surfactant applied to the outer surface; and
   (iii) silicon-containing polymeric structure applied to the surfactant such that silica at least partially surrounds the active ingredient.

2. The silicon-containing polymeric structure coated/encapsulated active ingredient according to claim 1, wherein the active ingredient comprises a metal pyrithione.

3. The silicon-containing polymeric structure coated/encapsulated pyrithione compound according to claim 2, wherein the metal is selected from the group consisting of zinc, copper and zirconium.

4. The silicon-containing polymeric structure coated/encapsulated pyrithione compound according to claim 2, wherein the silicon-containing polymeric structure comprises pores therein.

5. An antimicrobial polymer composition comprising a polymer matrix having a silicon-containing polymeric structure coated/encapsulated pyrithione compound according to claim 1 dispersed in the polymer matrix.

6. The antimicrobial polymer composition according to claim 5, wherein the polymer matrix comprises a chlorine containing polymer.

7. The antimicrobial polymer composition according to 6, wherein the polymer matrix comprises polyvinylchloride.

8. The antimicrobial polymer composition according to claim 5, wherein the polymer matrix comprises a polyurethane.

9. A molded article comprising the antimicrobial polymer composition according to claim 5.

10. A foam comprising the antimicrobial polymer composition according to claim 8.

11. A coating composition for coating a substrate, wherein the composition comprises the silicon-containing polymeric structure coated/encapsulated pyrithione according to claim 5.

12. A method of preparing a silicon-containing polymeric structure coated/encapsulated active ingredient, said method comprising:

(i) providing a solid water-insoluble active ingredient selected from pyrithione compounds, basic copper carbonate, isothiazolinone compounds, substituted triazines, carbamates, triazoles and combinations thereof;

(ii) dispersing the active ingredient in a liquid medium in which the active ingredient is insoluble to form a suspension of the active ingredient;

(iii) adding a silicon-containing precursor for the polymeric structure to the suspension; and

(iv) reacting the silicon-containing precursor to form the silicon-containing polymeric structure, wherein the silicon-containing polymeric structure is formed around the active ingredient, thereby forming a silicon-containing polymeric structure coated/encapsulated active ingredient.

13. The method according to claim 12, wherein said dispersing comprises mixing the active ingredient with a dispersant and water to form a mixture and mixing the mixture for a period of time to form a suspension the active ingredient in water.

14. The method according to claim 13, wherein said mixing comprises, low shear mixing, high shear mixing or sonication.

15. The method according to claim 12, further comprising adjusting the pH of the suspension of the active ingredient to a pH within a range of about 2 to about 12.

16. The method according to claim 15, wherein the pH is adjusted to a range of about 3 to about 6.

17. The method according to claim 15, wherein the pH is adjusted to a range of about 8 to about 12.

18. The method according to claim 12, wherein the pyrithione compound comprises a metal pyrithione compound.

19. The method according to claim 18, wherein the metal of the metal pyrithione compound comprises zinc, copper, or zirconium.

20. The method according to claim 12, wherein the silicon-containing precursor comprises a silica precursor comprising silanes of the formula (I):

$Si(Y)_m(X)_n$ (I)

wherein Y is a hydrolysable substituent and X is a substituent which is not reactive with the hydrolysable substituent during the polymerization reaction; m is an integer from 2-4; n is an integer of 0-2; wherein m+n=4; and wherein the average value of m is at least three.

21. The method according to claim 12, further comprising isolating the silicon-containing polymeric structure coated/encapsulated active ingredient compound from the water.

22. The method according to claim 21, wherein the silicon-containing polymeric structure coated/encapsulated active ingredient is in powder form.

23. The method according to claim 12, wherein the active ingredient comprises zinc pyrithione, said dispersing comprises mixing the zinc pyrithione with a dispersant and water to form a mixture and mixing the mixture for a period of time to form a suspension the pyrithione compound in water; said mixing comprises, low shear mixing, high shear mixing or sonication.

24. The method according to claim 23, wherein the dispersant is cationic, anionic or neutral dispersant.

25. A silicon-containing polymeric structure coated/encapsulated active ingredient prepared by the process of any one of claims 12-24.