Claims

1. A coating comprising:
   a polymer matrix having acidic groups and halogen groups; and
   an acidified, silane modified silicate material bound to the polymer matrix, the acidified, silane modified silicate material comprising amino groups and halogen groups;
   wherein the amino groups of the acidified, silane modified silicate material bind to the acidic groups of the polymer matrix by amine-acid coupling.

2. The coating of claim 1, wherein the silicate material is selected from the group consisting of serpentine, clay, mica and combinations thereof.

3. The coating of claim 1 or 2, wherein the polymer matrix comprises a copolymer of halogen-containing repeating units, acidic-containing repeating units, and optionally hydrocarbon repeating units.

4. The coating of any one of claims 1 to 3, wherein the polymer matrix is a copolymer of vinylidene chloride repeating units and acid-containing repeating units.

5. A composite coating emulsion comprising:
   a polymer matrix having acidic groups and halogen groups;
   an acidified, silane modified silicate material comprising amino groups and halogen groups; and
   a solvent such that the polymer matrix and the acidified, silane modified silicate material are dispersed in the solvent; and
   wherein the amino groups of the acidified, silane modified silicate material are configured to bind to the acidic groups of the polymer matrix by amine-acid coupling.

6. The composite coating emulsion of claim 5, wherein the silicate material is selected from the group consisting of serpentine, clay, mica and combinations thereof.

7. The composite coating emulsion of claim 5 or 6, wherein the polymer matrix comprises a copolymer of halogen-containing repeating units, acidic -containing repeating units, and optionally hydrocarbon repeating units.

8. The composite coating emulsion of any one of claims 5 to 7, wherein the polymer matrix is a copolymer of vinylidene chloride repeating units and acid-containing repeating units.

9. The composite coating emulsion of any one of claims 5 to 8, wherein the solvent is water, an alcohol or combinations thereof.

10. A coated article comprising the coating of any one of claims 1 to 4, an optional primer coating and a substrate.

11. The coated article of claim 10, wherein the coating has a weight percentage in the range of 0.5 weight% to 5 weight% based on the weight of the article.

12. A method of preparing a composite coating emulsion comprising:
a step of mixing an acidified, silane modified silicate material, and a polymer matrix in a solvent;
wherein the polymer matrix has acidic groups and halogen groups;
wherein the acidified, silane modified silicate material comprises amino groups and halogen groups; and
wherein the step of mixing of the acidified, silane modified silicate material, and the polymer matrix results in amino groups of the acidified, silane modified silicate material binding to the acidic groups of the polymer matrix by amine-acid coupling.

13. The method of claim 12, further comprising, before said mixing step, steps of:
(a) acidifying a silicate material to form an acidified silicate material; and
(b) subjecting the acidified silicate material to a silane treatment to form an acidified, silane modified silicate material.

14. The method of claim 13, further comprising, before said acidifying step (a), a step of (a1) dispersing silicate minerals in the solvent and stirring overnight to form a silicate dispersion.

15. The method of any one of claims 12 to 14, wherein the silicate material is selected from the group consisting of serpentine, clay, mica and combinations thereof.

16. The method of any one of claims 12 to 15, wherein the polymer matrix comprises a copolymer of halogen-containing repeating units, acidic-containing repeating units, and optionally hydrocarbon repeating units.

17. The method of any one of claims 12 to 16, wherein the polymer matrix is a copolymer of vinylidene chloride repeating units and acid-containing repeating units.

18. The method of any one of claims 12 to 17, wherein the solvent is water, an alcohol or combinations thereof.

19. A method of preparing a coated article comprising a step of applying the composite coating emulsion of any one of claims 5 to 9 on a substrate.

20. The method of claim 19, further comprising a step of applying a primer coating on the substrate before the step of applying the composite coating emulsion on the substrate.