CLAIMS

1. A corrosion-resistant coating comprising a plurality of magnetic particles dispersed in a polymer matrix,

where the polymer matrix is non-polar and hydrophobic; and

where the magnetic particles comprise:

an adhesion region comprising a ferromagnetic material, and

a polymer interface region surrounding the adhesion region comprising a plurality of ligands, where the ligands comprise the general formula X^A—R—X^E, where:

X^A is an anchoring moiety proximal the adhesion region, where the anchoring moiety is polar;

R is a hydrocarbyl chain; and

X^E is an end group proximal the polymer matrix, where the end group is non-polar.

2. The corrosion-resistant coating of claim 1, where the anchoring moiety comprises oxygen or sulfur.

3. The corrosion-resistant coating of claim 1, where the hydrocarbyl chain comprises from 1 to 100 carbons.

4. The corrosion-resistant coating of claim 1, where the magnetic particles have an average longest dimension of from 1 nanometers (nm) to 100 micrometers (μm).

5. The corrosion-resistant coating of claim 1, where the magnetic particles are dispersed through the full thickness of the polymer matrix.

6. The corrosion-resistant coating of claim 1, where the magnetic particles are dispersed through from 10% to 50% of the full thickness of the polymer matrix.

7. The corrosion-resistant coating of claim 1, where the adhesion region of the magnetic particles comprises a core-shell structure with the ferromagnetic material forming a core and a second distinct material forming a shell surrounding the core.

8. The corrosion-resistant coating of claim 1, where the ferromagnetic material is crystalline.

9. A method of producing a corrosion-resistant article, the method comprising:

applying a corrosion-resistant coating to an article, where the corrosion-resistant coating comprises a plurality of magnetic particles dispersed in a polymer matrix,

where the polymer matrix is non-polar and hydrophobic; and

the magnetic particles comprise:

an adhesion region comprising a ferromagnetic material, and

a polymer interface region surrounding the adhesion region comprising a plurality of ligands, where the ligands comprise the general formula X^A—R—X^E, where

X^A is an anchoring moiety proximal the adhesion region, where the anchoring moiety is polar;

R is a hydrocarbyl chain; and

X^E is an end group proximal the polymer matrix, where the end group is non-polar; and

curing the corrosion-resistant coating to produce the corrosion-resistant article.

10. The method of claim 9, where the corrosion-resistant coating is cured with a curing agent and the curing agent also functions as the ligand.

11. The method of claim 9, further comprising producing the corrosion-resistant coating by synthesizing the plurality of magnetic particles dispersed in the polymer matrix in-situ.

12. The method of claim 9, further comprising producing the corrosion-resistant coating by adding the plurality of magnetic particles to the polymer matrix in an uncured state, and subsequently curing the polymer matrix.

13. The method of claim 9, where the polymer matrix is a thermosetting polymer.

14. The method of claim 9, where the curing step occurs before the corrosion-resistant coating is applied to the article.

15. The method of claim 9, where the curing step occurs after the corrosion-resistant coating is applied to the article.