coating that does not flake off. There is a need in the art for such articles, and methods of making such articles.

[0004] Coatings have been used in products, such as for enhancing the desirable features of rubber gloves. Previous coatings have been developed, such as those disclosed in U.S. Patent Nos. 4,548,844; 4,575,476; 6,242,042; 6,706,313; 7,179415; 6,772,443; 7,032,251; 6,706,836; 6,743,880; 7,019,067; 6,653,427; 6,828,399; 6,284,856; and 5,993,923, each of which is incorporated in its entirety as if set forth fully herein. All references cited herein are incorporated by reference in their entirety.

SUMMARY

[0004a] In one aspect of the present disclosure, there is provided a coated article comprising:

an article; and

a coating composition comprising an emulsion;

wherein the emulsion comprises at least one water-soluble monomer and more than one different water-insoluble monomers;

wherein the at least one water-soluble monomer is selected from the group consisting of 2-hydroxyethyl methacrylate and 4-hydroxybutyl acrylate; and

wherein the more than one different water-insoluble monomers are selected from the group consisting of methyl acrylate, ethyl acrylate, butyl acrylate, propyl acrylate, 2-ethylhexyl acrylate, butyl methacrylate, methyl methacrylate, lauryl methacrylate, stearyl methacrylate, 2-ethylhexyl methacrylate, trifluoroethyl methacrylate, isooctyl acrylate, isodecyl acrylate, and dimethylaminoethyl methacrylate.

[0004b] In another aspect of the present disclosure, there is provided a method of making a coated rubber glove, comprising:

applying a coating material to a rubber glove formed upon a glove mold to result in an emulsion coated glove, the coating material comprising an emulsion having at least one water-soluble monomer and more than different one water-insoluble monomers;

curing the emulsion coated glove on the glove mold at a temperature of between about 100°C to 160°C;

subjecting the emulsion coated glove to a leaching solution;

optionally dipping the emulsion coated glove in a slurry composition;

drying the emulsion coated glove; and

removing the coated glove from the glove mold to result in the coated rubber glove;

wherein the at least one water-soluble monomer is selected from the group consisting of 2-hydroxyethyl methacrylate and 4-hydroxybutyl acrylate; and

wherein the more than one different water-insoluble monomers are selected from the group consisting of methyl acrylate, ethyl acrylate, butyl acrylate, propyl acrylate, 2-ethylhexyl acrylate, butyl methacrylate, methyl methacrylate, lauryl methacrylate, stearyl methacrylate, 2-ethylhexyl methacrylate, trifluoroethyl methacrylate, isooctyl acrylate, isodecyl acrylate, and dimethylaminoethyl methacrylate.

[0004c] In yet another aspect of the present disclosure, there is provided coating composition comprising:

at least one water-soluble monomer;

more than one different water-insoluble monomers; and

one or more additional components selected from the group consisting of surfactant, stabilizer, and crosslinker;

wherein the at least one water-soluble monomer is selected from the group consisting of 2-hydroxyethyl methacrylate and 4-hydroxybutyl acrylate; and

wherein the more than one different water-insoluble monomers are selected from the group consisting of methyl acrylate, ethyl acrylate, butyl acrylate, propyl acrylate, 2-ethylhexyl acrylate, butyl methacrylate, methyl methacrylate, lauryl methacrylate, stearyl methacrylate, 2-ethylhexyl methacrylate, trifluoroethyl methacrylate, isooctyl acrylate, isodecyl acrylate, and dimethylaminoethyl methacrylate.

[0004d] In a further aspect of the present disclosure, there is provided a method of making a coated latex glove, comprising:

forming a latex film on a glove mold;

dipping the latex film on the mold into a priming solution;

drying the latex film in an oven at a temperature between about 100°C to about 150°C for about 1 to about 2 minutes;

preparing a coating composition comprising a copolymer emulsion having at least one water-soluble monomer and more than one different water-insoluble monomers;

applying the coating composition to the latex film on the mold to result in an emulsion coated glove;

curing the emulsion coated glove at a temperature of between about 100°C to about 160°C;

removing the emulsion coated glove from the glove mold to result in the coated latex glove;

wherein the at least one water-soluble monomer is selected from the group consisting of 2 -hydroxy ethyl methacrylate and 4-hydroxybutyl acrylate; and

wherein the more than one different water insoluble monomers are selected from the group consisting of methyl acrylate, ethyl acrylate, butyl acrylate, propyl acrylate, 2-ethylhexyl acrylate, methyl methacrylate, lauryl methacrylate, 2-ethylhexyl methacrylate, trifluoroethyl methacrylate, isooctyl acrylate, isodecyl acrylate, and dimethylaminoethyl methacrylate.

[0005] A novel and useful preparation of a copolymer emulsion is provided. In one embodiment, a method for forming a copolymer emulsion is provided by combining and copolymerizing at least one water soluble monomer and at least one water insoluble monomer, wherein the monomers used in the process are comprised of at least 50% by weight water soluble monomer and at least 10% by weight water insoluble monomer as measured by the total monomer weight.

[0006] In another embodiment, the method for the preparation of a copolymer emulsion is provided that includes concurrently combining a monomer feed and a pre-emulsion feed to form an emulsion, wherein the monomer feed comprises at least 50% by weight water soluble monomer based on the total monomer weight of the monomer feed and the pre-emulsion feed, and the pre-emulsion feed comprises at least 10% by weight water insoluble monomer based on the total monomer weight of the monomer feed and the pre-emulsion feed.

CLAIMS

What is claimed is:

1. A coated article comprising:

an article; and

a coating composition comprising an emulsion;

wherein the emulsion comprises at least one water-soluble monomer and more than one different water-insoluble monomers;

wherein the at least one water-soluble monomer is selected from the group consisting of 2-hydroxyethyl methacrylate and 4-hydroxybutyl acrylate; and

wherein the more than one different water-insoluble monomers are selected from the group consisting of methyl acrylate, ethyl acrylate, butyl acrylate, propyl acrylate, 2-ethylhexyl acrylate, butyl methacrylate, methyl methacrylate, lauryl methacrylate, stearyl methacrylate, 2-ethylhexyl methacrylate, trifluoroethyl methacrylate, isooctyl acrylate, isodecyl acrylate, and dimethylaminoethyl methacrylate.

2. The article of claim 1, wherein the article comprises a glove.

3. The article of claim 1, wherein the emulsion further comprises one or more of the following additional components selected from the group consisting of surfactant, stabilizer, and crosslinker;

wherein the surfactant comprises sodium lauryl ether sulfate;

wherein the stabilizer comprises polyvinyl alcohol; and

wherein the crosslinker is selected from the group consisting of formaldehydes, melamine formaldehydes, metal salts, aziridines, isocyanates, dichromates, polyfunctional aziridine, titanium acetylacetonates, polyamide-epichlorohydrin-type resin, and carbodiimide compounds.

4. The article of claim 3, wherein the crosslinker comprises melamine formaldehyde.

5. The article of claim 1, wherein the emulsion comprises 2-hydroxylethyl methacrylate, 2-ethylhexylacrylate, and methacrylic acid.

6. The article of claim 1, wherein the emulsion comprises 2-hydroxylethyl methacrylate, 2-ethylhexylacrylate, methyl methacrylate, and methacrylic acid.

7. A method of making a coated rubber glove, comprising:

applying a coating material to a rubber glove formed upon a glove mold to result in an emulsion coated glove, the coating material comprising an emulsion having at least one water-soluble monomer and more than one different water-insoluble monomers;

curing the emulsion coated glove on the glove mold at a temperature of between about 100°C to 160°C;

subjecting the emulsion coated glove to a leaching solution;

optionally dipping the emulsion coated glove in a slurry composition;

drying the emulsion coated glove; and

removing the coated glove from the glove mold to result in the coated rubber glove;

wherein the at least one water-soluble monomer is selected from the group consisting of 2-hydroxyethyl methacrylate and 4-hydroxybutyl acrylate; and

wherein the more than one different water-insoluble monomers are selected from the group consisting of methyl acrylate, ethyl acrylate, butyl acrylate, propyl acrylate, 2-ethylhexyl acrylate, butyl methacrylate, methyl methacrylate, lauryl methacrylate, stearyl methacrylate, 2-ethylhexyl methacrylate, trifluoroethyl methacrylate, isooctyl acrylate, isodecyl acrylate, and dimethylaminoethyl methacrylate.

8. The method of claim 7, wherein the emulsion further comprises one or more of the following additional components selected from the group consisting of surfactant, stabilizer, and crosslinker;

wherein the surfactant comprises sodium lauryl ether sulfate;

wherein the stabilizer comprises polyvinyl alcohol; and

wherein the crosslinker is selected from the group consisting of formaldehydes, melamine formaldehydes, metal salts, aziridines, isocyanates, dichromates, polyfunctional aziridine, titanium acetylacetonates, polyamide-epichlorohydrin-type resin, and carbodiimide compounds.

9. The method of claim 7, wherein the emulsion comprises 2-hydroxylethyl methacrylate, 2-ethylhexylacrylate, and methacrylic acid.

10. The method of claim 7, wherein the emulsion comprises 2-hydroxylethyl methacrylate, 2-ethylhexylacrylate, methyl methacrylate, and methacrylic acid.

11. The method of claim 7, wherein the curing of the emulsion coated glove occurs at a temperature between about 135°C to about 145°C.

12. The method of claim 7, wherein the curing of the emulsion coated glove occurs for a time period of between about 20 to about 40 minutes.

13. A coating composition comprising:

at least one water-soluble monomer;

more than one different water-insoluble monomers; and

one or more additional components selected from the group consisting of surfactant, stabilizer, and crosslinker;

wherein the at least one water-soluble monomer is selected from the group consisting of 2-hydroxyethyl methacrylate and 4-hydroxybutyl acrylate; and

wherein the more than one different water-insoluble monomers are selected from the group consisting of methyl acrylate, ethyl acrylate, butyl acrylate, propyl acrylate, 2-ethylhexyl acrylate, butyl methacrylate, methyl methacrylate, lauryl methacrylate, stearyl methacrylate, 2-ethylhexyl methacrylate, trifluoroethyl methacrylate, isooctyl acrylate, isodecyl acrylate, and dimethylaminoethyl methacrylate.

14. The method of claim 7, wherein the slurry composition comprises silicone.

15. The method of claim 7, wherein the emulsion coated glove is subjected to a chlorination process.

16. The method of claim 7, wherein the emulsion coated glove is lubricated.

17. The method of claim 7, further comprising the step of pretreating the rubber glove formed on the mold with a priming solution prior to applying the coating material;

wherein the priming solution comprises one of the compounds selected from the group consisting of sulfuric acid, hydrochloric acid and aluminum sulphate.

18. A method of making a coated latex glove, comprising:

forming a latex film on a glove mold;

dipping the latex film on the mold into a priming solution;

drying the latex film in an oven at a temperature between about 100°C to about 150°C for about 1 to about 2 minutes;

preparing a coating composition comprising a copolymer emulsion having at least one water-soluble monomer and more than one different water-insoluble monomers;

applying the coating composition to the latex film on the mold to result in an emulsion coated glove;

curing the emulsion coated glove at a temperature of between about 100°C to about 160°C;

removing the emulsion coated glove from the glove mold to result in the coated latex glove;

wherein the at least one water-soluble monomer is selected from the group consisting of 2 -hydroxy ethyl methacrylate and 4-hydroxybutyl acrylate; and

wherein the more than one different water insoluble monomers are selected from the group consisting of methyl acrylate, ethyl acrylate, butyl acrylate, propyl acrylate, 2-ethylhexyl acrylate, methyl methacrylate, lauryl methacrylate, 2-ethylhexyl methacrylate, trifluoroethyl methacrylate, isooctyl acrylate, isodecyl acrylate, and dimethylaminoethyl methacrylate.

19. The method of claim 7, further comprising maintaining the coating composition at a temperature range of about 15°C to about 75°C during application of the coating composition to the latex film.

20. The method of claim 7, wherein curing the emulsion further comprises curing for a time of about 30 minutes.

21. The method of claim 7, wherein the water-soluble monomer comprises from about 50% to about 97% of the total monomer weight.

22. The method of claim 7, wherein the water insoluble monomer comprises at least 15% of the total monomer weight.