resin known in the art, and will be chosen to be reactive with the functional group or groups on the polyester. It will be appreciated that the coatings of the present invention cure through the reaction of the hydroxyl groups and/or other functionality and the crosslinker and not through the double bonds of the polycarboxylic acid/anhydride/ester moiety, to the extent any such unsaturation exists in the branched polyester.

[0033] Non-limiting examples of suitable crosslinkers include phenolic resins, amino resins, epoxy resins, isocyanate resins, beta-hydroxy (alkyl) amide resins, alkylated carbamate resins, polyacids, anhydrides, organometallic acid-functional materials, polyamines, polyamides, aminoplasts and mixtures thereof. In certain embodiments, the crosslinker is a phenolic resin comprising an alkylated phenol/formaldehyde resin with a functionality ≥ 3 and difunctional o-cresol/formaldehyde resins. Such crosslinkers are commercially available from Hexion as BAKELITE 6520LB and BAKELITE 7081LB.

[0034] Suitable isocyanates include multifunctional isocyanates. Examples of multifunctional polyisocyanates include aliphatic diisocyanates like hexamethylene diisocyanate and isophorone diisocyanate, and aromatic diisocyanates like toluene diisocyanate and 4,4'-diphenylmethane diisocyanate. The polyisocyanates can be blocked or unblocked. Examples of other suitable polyisocyanates include isocyanurate trimers, allophanates, and uretdiones of diisocyanates and polycarbodiimides such as those disclosed in United States Patent Application Serial Number 12/056,304 filed March 27, 2008, ~~incorporated by reference in pertinent part herein~~. Suitable polyisocyanates are well known in the art and widely available commercially. For example, suitable polyisocyanates are disclosed in United States Patent Number 6,316,119 at columns 6, lines 19-36~~, incorporated by reference herein~~. Examples of commercially available polyisocyanates include DESMODUR VP2078 and DESMODUR N3390, which are sold by Bayer Corporation, and TOLONATE HDT90, which is sold by Rhodia Inc.

[0035] Suitable aminoplasts include condensates of amines and/or amides with aldehyde. For example, the condensate of melamine with formaldehyde is a suitable aminoplast. Suitable aminoplasts are well known in the art. A suitable aminoplast is disclosed, for example, in United States Patent Number 6,316,119 at column 5, lines 45-55, ~~incorporated by reference herein~~.

[0036] In preparing the present coatings, the branched polyester and the crosslinker can be dissolved or dispersed in a single solvent or a mixture of solvents. Any solvent that will enable the formulation to be coated on a substrate may be used, and these will be well known to the person skilled in the art. Typical examples include water, organic solvent(s), and/or mixtures thereof. Suitable organic solvents include glycols, glycol ether alcohols, alcohols, ketones, and aromatics, such as xylene and toluene, acetates, mineral spirits, naphthas and/or mixtures thereof. "Acetates" include the glycol ether acetates. In certain embodiments, the solvent is a non-aqueous solvent. "Non-aqueous solvent" and like terms means that less than 50% of the solvent is water. For example, less than 10%, or even less than 5% or 2%, of the solvent can be water. It will be understood that mixtures of solvents, including or excluding water in an amount of less than 50%, can constitute a "non-aqueous solvent". In other embodiments, the coating is aqueous or water-based. This means that 50% or more of the solvent is water. These embodiments have less than 50%, such as less than 20%, less than 10%, less than 5% or less than 2% solvent.

[0037] In certain embodiments, the coatings of the present invention further comprise a curing catalyst. Any curing catalyst typically used to catalyze crosslinking reactions between polyester resins and crosslinkers, such as phenolic resins, may be used, and there are no particular limitations on the catalyst. Examples of such a curing catalyst include phosphoric acid, alkyl aryl sulphonic acid, dodecyl benzene sulphonic acid, dinonyl naphthalene sulphonic acid, and dinonyl naphthalene disulphonic acid.

red"), titanium dioxide, carbon black, carbon fiber, graphite, other conductive pigments and/or fillers and mixtures thereof. The terms "pigment" and "colored filler" can be used interchangeably.

[0042] Example dyes include, but are not limited to, those that are solvent and/or aqueous based such as acid dyes, azoic dyes, basic dyes, direct dyes, disperse dyes, reactive dyes, solvent dyes, sulfur dyes, mordant dyes, for example, bismuth vanadate, anthraquinone, perylene aluminum, quinacridone, thiazole, thiazine, azo, indigoid, nitro, nitroso, oxazine, phthalocyanine, quinoline, stilbene, and triphenyl methane.

[0043] Example tints include, but are not limited to, pigments dispersed in water-based or water-miscible carriers such as AQUA-CHEM 896 commercially available from Degussa, Inc., CHARISMA COLORANTS and MAXITONER INDUSTRIAL COLORANTS commercially available from Accurate Dispersions division of Eastman Chemicals, Inc.

[0044] As noted above, the colorant can be in the form of a dispersion including, but not limited to, a nanoparticle dispersion. Nanoparticle dispersions can include one or more highly dispersed nanoparticle colorants and/or colorant particles that produce a desired visible color and/or opacity and/or visual effect. Nanoparticle dispersions can include colorants such as pigments or dyes having a particle size of less than 150 nm, such as less than 70 nm, or less than 30 nm. Nanoparticles can be produced by milling stock organic or inorganic pigments with grinding media having a particle size of less than 0.5 mm. Example nanoparticle dispersions and methods for making them are identified in United States Patent Number 6,875,800 B2~~, which is incorporated herein by reference~~. Nanoparticle dispersions can also be produced by crystallization, precipitation, gas phase condensation, and chemical attrition (i.e., partial dissolution). In order to minimize re-agglomeration of nanoparticles within the coating, a dispersion of resin-coated nanoparticles can be used. As used herein, a

"dispersion of resin-coated nanoparticles" refers to a continuous phase in which is dispersed discreet "composite microparticles" that comprise a nanoparticle and a resin coating on the nanoparticle. Example dispersions of resin-coated nanoparticles and methods for making them are identified in United States Patent Application Publication 2005-0287348 A1, filed June 24, 2004, United States Provisional Application Serial Number 60/482,167 filed June 24, 2003, and United States Patent Application Serial Number 11/337,062, filed January 20, 2006~~, which is also incorporated herein by reference~~.

[0045] Example special effect compositions that may be used include pigments and/or compositions that produce one or more appearance effects such as reflectance, pearlescence, metallic sheen, phosphorescence, fluorescence, photochromism, photosensitivity, thermochromism, goniochromism and/or color-change. Additional special effect compositions can provide other perceptible properties, such as opacity or texture. In a non-limiting embodiment, special effect compositions can produce a color shift, such that the color of the coating changes when the coating is viewed at different angles. Example color effect compositions are identified in United States Patent Number 6,894,086~~, incorporated herein by reference~~. Additional color effect compositions can include transparent coated mica and/or synthetic mica, coated silica, coated alumina, a transparent liquid crystal pigment, a liquid crystal coating, and/or any composition wherein interference results from a refractive index differential within the material and not because of the refractive index differential between the surface of the material and the air.

[0046] In certain non-limiting embodiments, a photosensitive composition and/or photochromic composition, which reversibly alters its color when exposed to one or more light sources, can be used in the coating of the present invention. Photochromic and/or photosensitive compositions can be activated by exposure to radiation of a specified wavelength. When the composition becomes excited, the molecular structure is changed and

the altered structure exhibits a new color that is different from the original color of the composition. When the exposure to radiation is removed, the photochromic and/or photosensitive composition can return to a state of rest, in which the original color of the composition returns. In one non-limiting embodiment, the photochromic and/or photosensitive composition can be colorless in a non-excited state and exhibit a color in an excited state. Full color-change can appear within milliseconds to several minutes, such as from 20 seconds to 60 seconds. Example photochromic and/or photosensitive compositions include photochromic dyes.

[0047] In a non-limiting embodiment, the photosensitive composition and/or photochromic composition can be associated with and/or at least partially bound to, such as by covalent bonding, a polymer and/or polymeric materials of a polymerizable component. In contrast to some coatings in which the photosensitive composition may migrate out of the coating and crystallize into the substrate, the photosensitive composition and/or photochromic composition associated with and/or at least partially bound to a polymer and/or polymerizable component in accordance with a non-limiting embodiment of the present invention, have minimal migration out of the coating. Example photosensitive compositions and/or photochromic compositions and methods for making them are identified in United States Application Serial Number 10/892,919 filed July 16, 2004~~, and incorporated herein by reference~~.

[0048] In general, the colorant can be present in any amount sufficient to impart the desired visual and/or color effect. The colorant may comprise from 1 to 65 weight percent of the present compositions, such as from 3 to 40 weight percent or 5 to 35 weight percent, with weight percent based on the total weight of the compositions.

[0049] An "abrasion resistant particle" is one that, when used in a coating, will impart some level of abrasion resistance to the coating as compared with the same coating lacking

What is claimed is:

1. A crosslinkable branched polyester polymer prepared by free radical polymerization of a double bond of a first unsaturated polyester prepolymer with ~~the~~ a double bond~~s~~ of a~~n~~ second unsaturated polyester prepolymer, wherein each prepolymer independently comprises~~ing~~:

a) a hard segment;

b) a polyol segment; and

c) an unsaturated polycarboxylic acid and/or an anhydride and/or ester thereof.

2. The polyester polymer of claim 1, wherein the hard segment comprises an aromatic and/or cycloaliphatic polyacid.

3. The polyester polymer of claim 2, wherein the hard segment comprises isophthalic acid.

4. The polyester polymer of claim 3, wherein the hard segment further comprises benzoic acid.

5. The polyester polymer of claim 1, wherein the polyol segment comprises 2-methyl-1,3-propanediol and/or neopentyl glycol.

6. The polyester polymer of claim 1, wherein the unsaturated polycarboxylic acid/anhydride/ester comprises maleic acid/anhydride/ester.

7. The polyester polymer of claim 1, wherein the hard segment comprises isophthalic acid, the polyol segment comprises 2-methyl-1,3-propanediol and/or neopentyl glycol, and the unsaturated polycarboxylic acid/anhydride/ester comprises maleic acid/anhydride/ester.

8. The polyester polymer of claim 1, wherein the M_w of the polyester polymer is 15,000-50,000.

9. The polyester polymer of claim 1, wherein the M_w of the polyester polymer is greater than 50,000.

10. The polyester polymer of claim 1, wherein the viscosity of the polyester polymer is Z or less at 60% total solids as measured by the Gardner-Holt bubble method.

11. The polyester polymer of claim 9, wherein the viscosity of the polyester polymer is Z or less at 60% total solids as measured by the Gardner-Holt bubble method.

12. A coating comprising the polyester of claim 1.

13. The coating of claim 12, wherein the hardness of the polyester as measured by the Fischer Micro-hardness test is 110-140 N/mm^2.

14. The coating of claim 12, wherein the polyester has a spotty failure of 15 to 20%, when measured by ASTM Method D 522-93.

15. The coating of claim 12, wherein the hard segment comprises isophthalic acid, the polyol segment comprises 2-methyl-1,3-propanediol and/or neopentyl glycol, and the unsaturated polycarboxylic acid/anhydride/ester comprises maleic acid/anhydride/ester.

16. The coating of claim 12, wherein the coating is a clearcoat.

17. The coating of claim 12, wherein the coating comprises a colorant.

18. A substrate coated at least in part with the coating of claim 12.

19. The substrate of claim 18, wherein the substrate is a metal can.

20. The substrate of claim 18, wherein the substrate is part of a vehicle.

21. The polyester polymer of claim 1, wherein the only unsaturation in the reaction product is from component (c).