TOOTH COATING COMPOSITIONS AND METHODS

RELATED APPLICATION

[0001] This application claims priority to U.S. Patent Application Serial No. 10/775,706 filed February 10, 2004, the contents of which are incorporated herein by reference.

INTRODUCTION

[0002] This invention relates to compositions and methods for whitening or coloring teeth. The invention also relates to compositions and methods for applying oral care actives or pharmaceutically actives, such as anti-caries agents or breath fresheners, to teeth.

[0003] Consumers wishing to whiten or color their teeth have a limited variety of products from which to choose. Successful application of some products, such as veneers, crowns and caps, involves destruction of tooth enamel, and requires the services of a dental professional such as a dentist. Furthermore, tooth whitening or coloring products have not been used as carriers for active materials such as pharmaceutically active compounds, anti-caries agents, or breath fresheners.

[0004] Thus, there is an ongoing need for new compositions and methods for whitening teeth, in particular compositions and methods for whitening teeth without destruction of tooth enamel, as well as compositions and methods for delivering active materials to the oral cavity.

SUMMARY

[0005] The present invention provides compositions and methods for imparting whiteness or color to teeth, using natural or synthetic resins and at least one colorant. In various embodiments, the present invention provides a tooth coating comprising at least 10% by weight of a natural resin system comprising at least two natural resins, a colorant, and pearlescent particles. In various embodiments, the tooth coating comprises a natural resin system comprising at least two different resins, a colorant, pearlescent particles, and an active material. In one embodiment, the present invention provides a tooth coating composition comprising at least 10% of a natural resin

system comprising colophonium, mastic, and shellac; the colorant titanium dioxide; and the pearlescent particle mica titanium.

[0006] The present invention also provides methods of coloring a tooth in a human or other animal subject comprising applying to a tooth a coating comprising: at least 10% by weight of a natural resin system comprising at least two natural resins, a colorant, and pearlescent particles. The present invention also provides a method of preventing or treating an oral care condition in a human or other animal subject comprising applying to a tooth of said subject a coating composition comprising at least 10% by weight of a natural resin system comprising at least two natural resins, a colorant, a pearlescent particle, and an oral care active.

[0007] It has been discovered that compositions and methods of this invention afford advantages over temporary whitening compositions among those known in the art including one or more of: enhanced coloring efficacy and aesthetics, enhanced stability in the oral cavity including, improved adherence of the tooth coating to the tooth surface in the presence of saliva, and delivery of oral care benefits. Further uses, benefits and embodiments of the present invention are apparent from the description set forth herein.

DETAILED DESCRIPTION

[0008] The following description of the preferred embodiment(s) is merely exemplary in nature and is in no way intended to limit the invention, its application, or uses.

[0009] The following definitions and non-limiting guidelines must be considered in reviewing the description of this invention set forth herein. The headings (such as "Introduction" and "Summary") used herein are intended only for general organization of topics within the disclosure of the invention, and are not intended to limit the disclosure of the invention or any aspect thereof. In particular, subject matter disclosed in the "Introduction" may include aspects of technology within the scope of the invention and may not constitute a recitation of prior art. Subject matter disclosed in the "Summary" is not an exhaustive or complete disclosure of the entire scope of the invention or any embodiments thereof. Classification or discussion of a material within a section of this specification as having a particular utility (e.g., as being a "system") is

made for convenience, and no inference should be drawn that the material must necessarily or solely function in accordance with its classification herein when it is used in any given composition.

[0010] The citation of references herein does not constitute an admission that those references are prior art or have any relevance to the patentability of the invention disclosed herein. All references cited in the Description section of this specification are hereby incorporated by reference in their entirety.

[0011] The description and specific examples, while indicating embodiments of the invention, are intended for purposes of illustration only and are not intended to limit the scope of the invention. Moreover, recitation of multiple embodiments having stated features is not intended to exclude other embodiments having additional features or other embodiments incorporating different combinations the stated of features. Specific Examples are provided for illustrative purposes of how to make and use the compositions and methods of this invention and, unless explicitly stated otherwise, are not intended to be a representation that given embodiments of this invention have, or have not, been made or tested.

[0012] As used herein, the words "preferred" and "preferably" refer to embodiments of the invention that afford certain benefits, under certain circumstances. However, other embodiments may also be preferred, under the same or other circumstances. Furthermore, the recitation of one or more preferred embodiments does not imply that other embodiments are not useful, and is not intended to exclude other embodiments from the scope of the invention.

[0013] As used herein, the word "include," and its variants, is intended to be non-limiting, such that recitation of items in a list is not to the exclusion of other like items that may also be useful in the materials, compositions, devices, and methods of this invention.

[0014] As referred to herein, all compositional percentages are by weight of the total composition, unless otherwise specified.

[0015] "A" and "an" as used herein indicate "at least one" of the item is present. As used herein, the term "about," when applied to the value for a parameter of a composition or method of this invention, indicates that the calculation or the measurement of the value allows some slight imprecision without having a substantial

effect on the chemical or physical attributes of the composition or method. If, for some reason, the imprecision provided by "about" is not otherwise understood in the art with this ordinary meaning, then "about" as used herein indicates a possible variation of up to 5% in the value.

Tooth Coating Compositions

[0016] In accordance with various embodiments of the present invention, a tooth coating composition is provided for imparting a color, preferably a natural white color, to a tooth surface. The tooth surface is generally comprised of dental enamel, and the whitening composition contacts and preferably adheres to the dental enamel to impart an immediate discernable coloring effect, thus rapidly altering the color of the surface of the tooth. As referred to herein, "tooth" or "teeth" refers to natural teeth, dentures, dental plates, fillings, caps, crowns, bridges, dental implants, and the like, and any other hard surfaced dental prosthesis either permanently or temporarily fixed within the oral cavity.

[0017] As used herein, "whitening" refers to a change in visual appearance of a tooth, preferably such that the tooth has a brighter shade. The change in color of a dental surface can be observed visually, for example with the aid of color comparison charts or gauges, or measured by colorimetry, using any suitable instrument such as a Minolta Chromameter, e.g., model CR-400 (Minolta Corp., Ramsey, NJ). The instrument can be programmed, for example, to measure Hunter Lab values or L*a*b* values according to the standard established by the International Committee of Illumination (CIE). The L*a*b* system provides a numerical representation of three-dimensional color space where L* represents a lightness axis, a* represents a red-green axis and b* represents a yellow-blue axis. The L* and b* axes are typically of greatest applicability to measurement of tooth whiteness. Increase in whiteness can be computed from differences in L*, a* and b* values before and after treatment, or between untreated and treated surfaces. A useful parameter is ΔE^*, calculated as the square root of the sum of the squares of differences in L*, a* and b* values, using the formula:

$$\Delta E^* = [(\Delta L^*)^2 + (\Delta a^*)^2 + (\Delta b^*)^2]^{1/2}$$

A higher value of ΔE^* indicates greater increase in whiteness. In various embodiments, the method of the present invention can effect a ΔE^* of at least about 1, or at least about 3, or at least about 4, or at least about 5.

[0018] The present invention includes tooth coating compositions and methods for imparting whiteness or color to teeth. Such compositions comprise at least 10% of a natural resin system, a colorant, and pearlescent particles. The colorant and pearlescent particles can impart whiteness or a non-white color to the teeth. Application of the compositions to the teeth in a mammal such as, for example a human, coats the teeth and imparts whiteness or a color to the teeth.

Natural Resin System

[0019] The natural resin system of embodiments of the present invention comprises at least two different natural resins distinct from one another. As used herein, "natural resins" include plant resins (i.e., those derived from plant sources) and animal resins (i.e., those derived from animal sources). Such resins include plant resins such as tree, shrub, and seed exudates of recent origin, fossil resins, mined resins such as asphaltite, and animal derived resins, such as shellac derived from lac insects. Selection of the natural resins used in the system may be based on factors such as: 1) desired hardness of the tooth coating, 2) desired level and longevity of adhesion of the tooth coating to the teeth, 3) film forming attributes, 4) the type of colorant and/or pearlescent particles employed, and 5) inclusion of additional active ingredients.

[0020] The natural resins vary based on acid number, polarity, molecular weight, softening point, or geographical origin of the resin. Standard classifications of natural resins by the American Gum Importers Association include dammars, East Indias, copals, accroides, elemi, mastic, sandarac, and colophonium, all of which are suitable for embodiments of the present invention. Natural resins can take the form of rosins, distillates, saps, oils, balsams, or gums, subcomponents thereof, and mixtures thereof.

[0021] Natural resins useful in tooth coating compositions of the present invention are found in or can be obtained from natural sources in their unmodified state. The natural resin may also be modified. Modification of the natural resin can include treatment steps such as purification, for example, to remove, colored contaminants, such as chromophoric impurities and other compounds which may be undesirable for inclusion in certain embodiments tooth coating composition. Other exemplary modifications include isolation of constituents to separate a subcomponent from other

constituents or to increase the concentration of desired subcomponent(s). Such purification can result in a tooth coating that is whiter than a comparable tooth coating in which impurities have not been removed from the natural resin.

[0022] Modified resins also include chemical derivatives, for example, maleic modified oils, phenolic modified rosin ester resins, maleic modified rosin ester resin, hydrogenated rosin, and the like. Additional chemical alterations of the natural resin include, but are not limited to, polymerization of a resin, copolymerization of several resins, and creating a synthetic resin that substantially imitates the attributes (acid number, polarity, molecular weight, softening point, etc.) of a natural resin from a living source.

[0023] The tooth coating preferably comprises a film-forming natural resin system. The total film-forming resin system concentration can be from at least about 10% up to about 95%, from about 15% to about 90%, from about 20% to about 85%, from about 25% or 26% to about 60%, 70%, or 80%, or from about 30% to about 60%. In preferred embodiments, the natural resin system comprises a mixture of at least one plant derived resin and at least one animal or insect derived resin. One such natural resin system comprises a mixture of colophonium and mastic (two plant derived natural resins) and shellac (an insect derived natural resin). A shellac useful herein is commercially available as Bulls Eye® shellac, marketed by Zinsser Co., Inc. (Somerset, New Jersey, U.S.A.)

[0024] A tooth coating of various embodiments optionally further comprises a synthetic polymer blended with the natural resin system. The term "polymer," as used herein, can encompass both acid and salt forms of homopolymers, copolymers, block copolymers, graft copolymers, cross-linked polymers, polymerizable monomers and salts thereof, and monomers that polymerizes in conjunction with the application to a tooth. Non-limiting examples of polymers within the scope of the present invention can include polyacrylamide, polymethacrylate, polyethylene glycol, polyvinylpyrrolidone, hydroxypropylmethyl cellulose, hydroxypropyl cellulose, hydroxyethyl cellulose, methyl cellulose, carboxymethyl cellulose, cross-linked polyvinyl pyrrolidone, polyvinylpyrrolidone-vinyl acetate copolymer, polyvinylalcohol, polyacrylate, polyacrylic acid, cross-linked polyacrylate, cross-linked polyacrylic acid, polyethylene oxide, polyethylene glycol, polyvinylalkyl ether-maleic acid copolymer, carboxy vinyl

polymer, polystyrene, and combination thereof. In some configurations, a polyvinylpyrrolidone can be a polyvinylpyrrolidone provided by International Specialty Products, Wayne, NJ. In some configurations, a hydroxypropylcellulose can be Klucel® hydroxypropylcellulose supplied by Hercules, Inc. Wilmington, Delaware, USA. In some configurations, the synthetic polymer can comprise at least about 90%, at least about 95%, at least about 96%, at least about 97%, at least about 98%, at least about 99% or greater percent of one monomeric repeating unit.

[0025] In configurations where the polymer comprises polymerizable monomers and salts thereof, a polymer can comprise at least about 90%, at least about 95%, at least about 96%, at least about 97%, at least about 98%, at least about 99% or greater percent of a monomer.

[0026] As noted above, in certain embodiments, the synthetic polymer can be a polyacrylate. Non-limiting examples of polyacrylates of the present invention include polyacrylate, cross-linked polyacrylates, alkyl acrylates such as polymethacrylate, alicyclic, aromatic, heterocyclic and vinyl group-containing polyacrylates, hydroxy-containing polyacrylates, such as alkoxy polyacrylates, carboxylic acid-containing polyacrylates, polycyanoacrylates, polydialkylaminoethylacrylates, polyfluoroalkylacrylates polyethylacrylate, polybutylacrylate such as poly n-butylacrylate and poly t-butyl acrylate, poly 2-ethylhexylacrylate, polycyclohexylacrylate, polybenzylacrylate, poly 2-hydroxyethylacrylate, poly2-hydroxypropylacrylate, polydimethylaminoethylacrylate, polydiethylaminoethylacrylate, polyglycidylacrylate, polytetrahydrofurfuryl acrylate; poly alkylmethacrylates, such as polymethylmethacrylate, polyethylmethacrylate, poly di and tri methacrylates, alicyclic, aromatic, heterocyclic and vinyl group-containing polymethacrylates, hydroxy containing polymethacrylates such as poly alkoxymethacrylates, poly dialkylaminoethyl methacrylates, polyfluoroalkylmethacrylates, polybutylmethacrylate such as poly n-butylmethacrylate, poly t-butyl methacrylate, poly 2-ethylhexyl methacrylate, poly cyclohexylmethacrylate, polybenzylmethacrylate, poly 2-hydroxyethyl methacrylate, poly 2-hydroxypropylmethacrylate, polydimethylaminoethylmethacrylate, polydiethylaminoethylmethacrylate, polyglycidylmethacrylate, and

polytetrahydrofurfurylmethacrylate. In one embodiment, the compositions of the present invention comprise colophonium, mastic, and a polyacrylate.

[0027] In some embodiments, the synthetic polymer can be a polyacrylamide or a substituted polyacrylamide. Non-limiting examples of polyacrylamides include polyacrylamide, cross-linked polyacrylamides, alkyl acrylamides such as polymethacrylamide, alicyclic, aromatic, heterocyclic and vinyl group-containing polyacrylamides, hydroxy-containing polyacrylamides, such as alkoxy polyacrylamides, carboxylic acid-containing polyacrylamides, polydialkylaminoethylacrylamides, polyfluoroalkylacrylamides, polyethylacrylamide, polybutylacrylamide, such as poly n-butylacrylamide and poly t-butylacrylamide, poly 2-ethylhexylacrylamide, polycyclohexylacrylamide, polybenzylacrylamide, poly 2-hydroxyethylacrylamide, poly 2-hydroxypropylacrylamide, polydimethylaminoethylacrylamide, polydiethylaminoethylacrylamide, polyglycidylacrylamide, polytetrahydrofurfurylacrylamide, alkyl methacrylamides, such as polymethylmethacrylamide, polyethylmethacrylamide, alicyclic, aromatic, heterocyclic and vinyl group-containing polymethacrylamides, hydroxy containing polymethacrylamides such as alkoxymethacrylamides, poly di and tri methacrylamides, polydialkylaminoethylmethacrylamides, polyfluoroalkyl methacrylamides, polybutylmethacrylamide such as poly n-butylmethacrylamide and t-butyl methacrylamide, poly 2-ethylhexyl methacrylamide, poly cyclohexylmethacrylamide, polybenzylmethacrylamide, poly 2-hydroxyethyl methacrylamide, poly 2-hydroxypropyl methacrylamide, polydimethylaminoethylmethacrylamide, polydiethylaminoethylmethacrylamide, polyglycidylmethacrylamide, and polytetrahydrofurfurylmethacrylamide.

[0028] In embodiments where the polymer is a monomer that polymerizes in conjunction with the application to a tooth, a tooth-coating composition can comprise cyanoacrylate monomer. Polymerization of the cyanoacrylate monomers can initiate upon contact with an aqueous fluid such as, for example, saliva on the surface of a tooth. Similarly, a tooth-coating composition can comprise an epoxy monomer which can polymerize upon contact of the composition with an initiator shortly before or after application to a tooth.

[0029] In various embodiments, the film-forming natural resin system (and optional synthetic polymer) used in compositions herein can have a weight average molecular weight, number average molecular weight, Z-average molecular weight or viscosity average molecular weight of from about 100 to about 5,000,000; from about 200 to about 2,500,000; from about 500 to about 1,000,000; from about 1,000 to about 500,000; or from about 10,000 to about 125,000.

[0030] In various embodiments, a tooth coating is a tooth-coating fluid. "Fluid," as used herein, means a non-gaseous, non-solid substance. In various embodiments, the fluid can be a liquid or a semi-solid. The viscosity of a fluid can range from freely flowable, low viscosity to extremely high viscosity in which flow is slow or even imperceptible to an unaided human under ambient conditions. For example, ordinary silica glass, such as glass comprised by a window pane, can be considered a fluid herein. A fluid herein can be, in certain embodiments, a thixotropic liquid. A "semi-solid" as used herein can be a gel, a colloid, a paste, an ointment, or a gum. As used herein, semi-solids and liquids are fluids distinguished on the basis of viscosity: a semi-solid is a high viscosity fluid, while a liquid has lower viscosity. There is no definitive dividing line between these types of fluids. A fluid of a tooth-coating composition herein can have a viscosity, measured at 25° C, ranging from about 0.18 milliPascal-sec (mPa-s) to about 100,000,000 mPa-s, from about 0.5 mPa-s to about 10,000,000 mPa-s, from about 1 mPa-s to about 1,000,000 mPa-s, from about 1.5 mPa-s to about 100,000 mPa-s, or from about 2 mPa-s to about 10,000 Pa-s. In some configurations, a fluid of a composition herein can have a viscosity of from about 100 to about 1,000 Pa-s. Without being limited by theory, it is believed that the viscosity of a fluid herein will vary with the amount (percentage) of a film-forming natural resin system and the weight average molecular weight of a film-forming natural resins.

[0031] In various embodiments, a tooth coating as described herein can be an adhesive fluid that adheres to teeth. Without being limited by theory, it is believed that the adhesiveness of the fluid of the present invention will vary with the amount (percentage) of the film-forming natural resin system and the weight average molecular weight of a film-forming natural resins. Adhesiveness can be measured using standard adhesion tests known in the art, for example, the adhesive test disclosed in US Patent 6,613,812 to Bui et al., issued September 2, 2003. In certain embodiments, the

adhesiveness between a tooth and a film formed from a fluid of the present invention can be from about at least 3.4 Mega Pascals (MPa), at least 6.9 MPa, at least 13.8 MPa, or greater.

[0032] In various embodiments of the present invention, a tooth coating comprising a film-forming natural resin system can form a film on a tooth surface following its application thereon. In some embodiments, a formulation of a composition can comprise the natural resin system and a volatile solvent which can dissolve the resin. The solvent can be, for example, an organic solvent, such as an alcohol, for example, ethanol. In various embodiments, the compositions of the present invention comprise a solvent in an amount of from about 1% to about 70%, from about 10% to about 50%, from about 20% to about 40%, or from about 25% to about 35%. In some embodiments, a film can form as the solvent is removed, for example through evaporation. In some embodiments, a film can form as monomers comprised by the composition polymerize. Without being limited by theory, it is believed that the longevity of a film, i.e., the period of time during which the film remains intact on the teeth, will vary with the percentage amount of the film-forming natural resin system in the film and the weight average molecular weight of the natural resins.

[0033] In various embodiments, a skilled artisan can select a percentage amount and weight average molecular weight of a polymer comprised by a composition herein depending on the intended usage. For example, a user desiring to color his or her teeth for one evening can use a formulation comprising a low percentage of resin and/or a low average molecular weight resin, while a user desiring a tooth-coating that lasts several months can use a formulation comprising a high percentage of resin and/or a high average molecular weight resin.

Colorant

[0034] Tooth coatings of embodiments of the present invention can comprise at least one colorant. The term "colorant" is used herein to describe a substance that can impart a color when applied to a tooth. A color, as used herein, can be any perceivable hue, tint, or shade, including but not limited to spectrum colors, colors comprised within the L*a*b* color space, colors comprised within the RGB color space, as well as black, brown, gray and white. A color imparted to a tooth by a tooth-coating fluid described

herein can be a white color or a non-white color. In various embodiments, the colorant can be a pigment or dye. In certain embodiments, a pigment can be a white pigment that can impart a white color to a tooth.

[0035] In some configurations, the colorant can comprise a plurality of pigment particles. A pigment, as used herein, can mean a particulate colorant. In some configurations, the compositions of the present invention can comprise one or more colorants at a concentration, individually or in total, of from about 0.1% (w/w) to about 20%, from about 1% to about 19%, from about 2% to about 18%, from about 3% to about 17%, from about 4% to about 16%, or from about 6% to about 15. In some configurations, the pigment particles can have an average size of from about 0.1 micrometer to about 1000 micrometers, from about 0.3 micrometer to about 100 micrometers, or from about 0.5 micrometers to about 50 micrometers in diameter or longest dimension.

[0036] In various embodiments, the colorant is a white pigment. The white pigment can be, for example, a white polymer. In some configurations, the white polymer can be a polymer such as described in US Patent 6,669,930 to Hoic. Non-limiting examples of such polymers include polyethylene, polypropylene, ethylene/propylene copolymer, polytetrafluoroethylene and polyhexafluoropropene. Specific examples of white polymers include polyethylene PE220, polypropylene, and polytetrafluoroethylene (PTFE), as supplied by PreSperse, Inc. (Somerset, New Jersey, USA). Such white polymers can be high molecular weight polymers having weight average molecular weight, number average molecular weight, Z-average molecular weight, or viscosity average molecular weight of from about 100 to about 10,000,000; from about 200 to about 5,000,000; from about 500 to about 1,000,000; from about 1,000 to about 500,000; from about 10,000 to about 100,000, or from about 20,000 to about 50,000.

[0037] In some configurations, the white pigment can comprise a metal oxide such as, for example, titanium oxide, aluminum oxide, tin oxide, calcium oxide, magnesium oxide, zinc oxide or a combination thereof.

[0038] In various embodiments, the colorant is a non-white colorant. In some configurations, the non-white colorant comprises an organic pigment. In certain embodiments, the non-white colorant can be a colorant approved for incorporation into a

food, drug or cosmetic by a regulatory agency, such as, for example, FD&C or D&C pigments and dyes approved by the FDA for use in the United States. Non-limiting examples of non-white colorants include FD&C Red No. 3 (sodium salt of tetraiodofluorescein), Food Red 17, 6-hydroxy-5-{(2-methoxy-5-methyl-4-sulphophenyl)azo}-2-naphthalenesulfonic acid, Food Yellow 13, mono sulphonic acid of quinophthalone, disulphonic acid of quinophthalone, monosulphonic acid of 2-(2-quinolyl) indanedione, disulphonic acid of 2-(2-quinolyl) indanedione, FD&C Yellow No. 5, FD&C Yellow No. 6, FD&C Green No. 3, FD&C Blue No. 1, FD&C Blue No. 2, D&C Red #30, phthalocyanine green, salts thereof and mixtures thereof.

[0039] In some embodiments, the non-white colorant is a dye lake pigment. In some configurations, the dye lake can be a calcium or aluminum salt of an FD&C dye such as, for example, FD&C Green #1 lake, FD&C Blue #2 lake, D&C Red #30 lake or FD&C Yellow #15 lake, or mixtures thereof.

[0040] In various embodiments, the non-white colorant comprises an inorganic pigment. Non-limiting examples of inorganic pigments can include certain metal oxide pigments such as for example, copper oxide, iron oxide and chromium oxide. Other non-white inorganic pigments that can be comprised by a tooth coating alone or in combination can be, for example, mineral pigments, such as ultramarine blue (lapis lazuli).

[0041] In certain configurations, the colorant comprises a dye contained within a water-insoluble polymer. In non-limiting example, the dye FD&C Blue #1 can be contained within a water-insoluble polymer such as a polyethylene such as that found in polyethylene beads (e.g., Microblue Spectrabeads, Micropowders, Inc., Tarrytown, New York, USA) In certain embodiments, the colorant can be a non-bleeding dye.

Pearlescent Particles

[0042] The tooth coatings of embodiments of the present invention can comprise pearlescent particles. In some configurations, the pearlescent particles can provide a white pearlescent color. In other configurations, the pearlescent particles can provide a non-white pearlescent color. "Pearlescence" and "pearlescent," as used herein, can refer to an optical property of a material in which the material has a pearl-like, lustrous appearance. A pearlescent material can provide a sense of depth and shine, and

can be aesthetically appealing. Without being limited by theory, pearlescent particles are believed to partially reflect and partially refract incident light. The extent of partial refraction or reflection of incident light by a pearlescent material can depend on the angle of light incidence and/or the angle of viewing. As used herein, "pearlescence" can include iridescence and opalescence. Pearlescent materials can appear monochromatic or appear to change color depending on viewing angle.

[0043] Pearlescent particles used in the compositions herein can provide aesthetic or cosmetic effects such as, for example, sparkle or luster. In some configurations, a composition can comprise monochromatic pearlescent particles. In some configurations, a composition can comprise pearlescent particles presenting a variety of colors. A tooth-coating composition can comprise pearlescent particles from about 0.1% to about 20%, from about 1% to about 19%, from about 2% to about 18%, from about 3% to about 17%, from about 4% to about 16%, or from about 6% to about 15%. In some configurations, the pearlescent particles can have an average size of from about 0.5 micrometer to about 500 micrometers, from about 1 micrometer to about 100 micrometers, or from about 2 micrometers to about 20 micrometers in diameter or longest dimension.

[0044] Pearlescent particles can comprise a single mineral or chemical species, such as, for example a silicate such as mica, or bismuth oxychloride. By "mica" is meant any one of a group of hydrous aluminum silicate minerals with platy morphology and perfect basal (micaceous) cleavage. Mica can be, for example, sheet mica, scrap mica or flake mica, as exemplified by muscovite, biotite or phlogopite type micas. In some embodiments, the pearlescent particles can comprise a complex comprising more than one mineral or chemical species, such as, for example, mica coated with a metal oxide such as titanium oxide. In some embodiments, pearlescent particles can comprise at least one non-white component, such as iron oxide, or can comprise an optically interfering composition, for example as provided by certain iridescent or opalescent minerals such as opal, or compositions comprising mica coated with one or more layers of titanium oxide. Pearlescent particles can also be of biological origin, for example fish scale or mother-of-pearl. Certain pearlescent particles of biological origin can comprise calcium carbonate, such as, for example, pearl, mollusk shell such as mother-of-pearl obtained from oyster shell, or nacre.

[0045] In some embodiments, pearlescent particles comprise those described as Timiron® pigments, Colorona® pigments, Dichrona® pigments, Soloron® pigments, Biron® powders, Biron® dispersions, Nailsyn® dispersions, or Microna® matte colors (all registered trademarks of EM Industries, Inc. Hawthorne, New York, USA, division of E. Merck). For example, mica titanium particles can be pearlescent particles such as Timiron® particles. White or pearlescent mica titanium particles can be, for example "Silverwhite" Timiron® particles such as Timiron® Starluster MP-115, Timiron® Supersheen MP-1001, Timiron® Sparkle MP-47, Timiron® Supersilk MP-1005, Timiron® Pearl Flake MP-10, Timiron® Pearl Sheen MP-30, Timiron® Super Silver Fine, Timiron® Gleamer Flake MP-111, Timiron® Ultraluster MP-45, Timiron® Transwhite MP-18, Timiron® Diamond Cluster MP-149, Timiron® Super Silver, Timiron® Stardust MP-80, Timiron® Arctic Silver or Timiron® Snowflake MP-99.

[0046] In some configurations, the mica particles comprise mica and a metal oxide such as titanium oxide in a non-white in color, presenting, for example, an iridescent or interference based color. For example, a tooth coating can comprise a gold pigment, such as Timiron® Gold Plus MP-25, Timiron® Sun Gold Sparkle MP-29, Timiron® Fine Gold MP-20, Timiron® Transgold MP-28 or Timiron® Karat Gold MP-24; an interference pigment, such as Timiron® Super Green, Timiron® Super Blue, Timiron® Super Red, Timiron® Gold MP-127, Timiron® Blue MP-155, Timiron® Super Gold, Timiron® Gold Glow MP-26, Timiron® Silk Gold, Timiron® Silk Red, Timiron® Silk Blue, Timiron® Silk Green, Timiron® Super Copper, Timiron® Super Violet, Timiron® Starlight Red, Timiron® Starlight Blue, Timiron® Starlight Gold, Timiron® Starlight Green, Timiron® Splendid Gold, Timiron® Splendid Red, Timiron® Splendid Blue, Timiron® Splendid Green, Timiron® Splendid Copper or Timiron® Splendid Violet, or a metallic color pigment such as Timiron® MP-60 Bronze or Timiron® MP-65 Copper. In some configurations, a fluid can comprise multiple types of pigments for cosmetic or aesthetic effects,

Non-polymeric material

[0047] In various configurations, the tooth-coating fluid of the present invention further comprise one or more additional components, such as, in non-limiting examples, a hydrophobic organic non-polymeric material. The hydrophobic organic

non-polymeric material can be, for example, a wax such as a beeswax, for example a white beeswax, or a paraffin. In various embodiments, the composition can comprise a hydrophobic non-polymeric material at a level of from about 0.01% to about 2% (w/w).

[0048] In a preferred embodiment, a tooth coating of the present invention comprises the natural resin system, an alcohol solvent, and a hydrophobic non-polymeric material. For example, a tooth coating of the present invention can comprise a natural resin system comprising colophonium, mastic, and shellac; an ethanol solvent; and paraffin as the hydrophobic non-polymeric material. The natural resin system can be present in the tooth coating at about 70%, the ethanol can be present at less than about 30%, and the paraffin may be present at about less than 1%. Specifically, the natural resin system can comprise about 33% of colophonium, about 12% of mastic, and about 22% of shellac of the tooth coating.

Sweeteners

[0049] In various embodiments, a sweetener is employed in the tooth coatings of the present invention. Sweeteners among those useful herein include orally acceptable natural or artificial, nutritive or non-nutritive sweeteners. Such sweeteners include dextrose, polydextrose, sucrose, maltose, dextrin, dried invert sugar, mannose, xylose, ribose, fructose, levulose, galactose, corn syrup (including high fructose corn syrup and corn syrup solids), partially hydrolyzed starch, hydrogenated starch hydrolysate, sorbitol, mannitol, xylitol, maltitol, isomalt, aspartame, neotame, saccharin and salts thereof, sucralose, dipeptide-based intense sweeteners, cyclamates, dihydrochalcones, and mixtures thereof. One or more sweeteners are optionally present in a total amount depending strongly on the particular sweetener(s) selected, but typically at levels of from about 0.01% to about 5% by weight, and preferably about 0.5% to about 2% by weight. Sodium saccharin is preferred for certain embodiments.

Flavoring Agent

[0050] The tooth whitening compositions of the present invention optionally comprise a flavoring agent. Flavorants among those useful herein include any material or mixture of materials operable to enhance the taste of the composition. Any orally acceptable natural or synthetic flavorant can be used, such as flavoring oils, flavoring

aldehydes, esters, alcohols, similar materials, and combinations thereof. Flavorants include vanillin, sage, marjoram, parsley oil, spearmint oil, cinnamon oil, oil of wintergreen (methyl salicylate), peppermint oil, clove oil, bay oil, anise oil, eucalyptus oil, citrus oils, fruit oils and essences including those derived from lemon, orange, lime, grapefruit, apricot, banana, grape, apple, strawberry, cherry, pineapple, etc., bean- and nut-derived flavors such as coffee, cocoa, cola, peanut, almond, etc., adsorbed and encapsulated flavorants, and mixtures thereof. Also encompassed within flavorants herein are ingredients that provide fragrance and/or other sensory effect in the mouth, including cooling or warming effects. Such ingredients include menthol, menthyl acetate, menthyl lactate, camphor, eucalyptus oil, eucalyptol, anethole, eugenol, cassia, oxanone, α-irisone, propenyl guaiethol, thymol, linalool, benzaldehyde, cinnamaldehyde, N-ethyl-p-menthan-3-carboxamine, N,2,3-trimethyl-2-isopropylbutanamide, 3-1-menthoxypropane-1,2-diol, cinnamaldehyde glycerol acetal (CGA), methone glycerol acetal (MGA), and mixtures thereof. One or more flavorants are optionally present in a total amount of about 0.03% to about 5% by weight, optionally in various embodiments from about 0.2 to about 1% by weight.

Oral Care and Systemic Actives

[0051] In various embodiments, an active material is included in the whitening compositions of the present invention. In some embodiments, the optional active ingredient is a "systemic active" which is operable to treat or prevent a disorder which, in whole or in part, is not a disorder of the oral cavity. In various embodiments, the active is an "oral care active" operable to treat or prevent a disorder or provide a cosmetic benefit within the oral cavity (e.g., to the teeth, gingiva or other hard or soft tissue of the oral cavity). Oral care actives among those useful herein include whitening agents, anticaries agents, tartar control agents, periodontal actives, abrasives, breath freshening agents, malodour control agents, tooth desensitizers, salivary stimulants, antibacterial agents, and combinations thereof. It is understood that while general attributes of each of the above categories of actives may differ, there may some common attributes and any given material may serve multiple purposes within two or more of such categories of actives. Some non-limiting examples of active materials are described

in U.S. Patent 6,596,298 to Leung et al., and in U.S. Patent Application 10/739,803 to Boyd, et al., filed December 18, 2003.

[0052] Compositions of the present invention may also be used for the treatment or prevention of systemic disorders, such as the improvement of overall systemic health characterized by a reduction in risk of development of systemic diseases, such as cardiovascular disease, stroke, diabetes, severe respiratory infection, premature and low birth weight infants (including associated post-partum dysfunction in neurologic/developmental function), and associated increased risk of mortality. Such methods include those disclosed in U.S. Patent Publication 2003/0206874, to Doyle et al., published November 6, 2003.

[0053] In some configurations, a bleaching agent can be, in non-limiting example, a peroxide, a hypochlorite, a peroxy acid, a metal chlorite, a perborate, a percarbonate such as sodium percarbonate, a persulfate such as an oxone as disclosed in US Patent 6,419,906 to Xu, et al., issued July 16, 2002, or an oxidoreductase. A peroxide compound can be, for example, hydrogen peroxide, urea peroxide, or calcium peroxide. A metal chlorite can be, for example, calcium chlorite, barium chlorite, magnesium chlorite, lithium chlorite, sodium chlorite, or potassium chlorite. An oxidoreductase can be, for example, an enzyme disclosed in US Patent 5,989,526 to Aaslyng et al., issued November 23, 1999, such as a laccase, an oxidase or a peroxidase.

[0054] The compositions of the present invention optionally comprise an antimicrobial (e.g., antibacterial) agent. One or more of such agents can be present. Suitable examples include without limitation copper (II) compounds such as copper (II) chloride, fluoride, sulfate and hydroxide, zinc ion sources such as zinc acetate, zinc citrate, zinc gluconate, zinc glycinate, zinc oxide, zinc sulfate and sodium zinc citrate, phthalic acid and salts thereof such as magnesium monopotassium phthalate, hexetidine, octenidine, sanguinarine, benzalkonium chloride, domiphen bromide, alkylpyridinium chlorides such as cetylpyridinium chloride (CPC) (including combinations of CPC with zinc and/or enzymes), tetradecylpyridinium chloride and N-tetradecyl-4-ethylpyridinium chloride, iodine, sulfonamides, bisbiguanides such as alexidine, chlorhexidine and chlorhexidine digluconate, piperidino derivatives such as delmopinol and octapinol, magnolia extract, grapeseed extract, menthol, geraniol, citral, eucalyptol, antibiotics such

as augmentin, amoxicillin, tetracycline, doxycycline, minocycline, metronidazole, neomycin, kanamycin and clindamycin, and the like.

[0055] Other suitable antibacterial agents include non-ionic and anionic antibacterial agents known to one of skill in the art. Example non-ionic antibacterial agents include the substantially water insoluble, noncationic antibacterial agents such as alkylphenoxy phenols; cycloalkyl-phenoxyphenols; 9,10-dihydrophenanthrenol; alkylphenols; cycloalkyl-phenols; phenolic compounds; halogenated carbanilides; halogenated salicylanilides; benzoic esters; halogenated diphenyl ethers, and mixtures thereof. A particularly suitable non-ionic antibacterial agent is a diphenyl ether such as 2,4,4'-trichloro-2'-hydroxydiphenyl ether (Triclosan) and 2,2'-dihydroxy-5,5'-dibromodiphenyl ether. A further illustrative list of useful antibacterial agents is provided in U.S. Patent No. 5,776,435 to Gaffar et al., issued July 7, 1998 incorporated herein by reference. One or more antimicrobial agents are optionally present in an antimicrobial effective total amount, typically about 0.05% to about 10%, for example about 0.1% to about 3% by weight, of the composition.

[0056] The compositions of the present invention optionally comprise an antioxidant. Any orally acceptable antioxidant can be used, including butylated hydroxyanisole (BHA), butylated hydroxytoluene (BHT), vitamin A, carotenoids, vitamin E, flavonoids, polyphenols, ascorbic acid, herbal antioxidants, chlorophyll, melatonin, and mixtures thereof.

[0057] The compositions of the present invention optionally comprise an orally acceptable zinc ion source useful, for example, as an antimicrobial, anticalculus or breath-freshening agent. One or more such sources can be present. Suitable zinc ion sources include without limitation zinc acetate, zinc citrate, zinc gluconate, zinc glycinate, zinc oxide, zinc sulfate, sodium zinc citrate and the like. One or more zinc ion sources are optionally and illustratively present in a total amount of about 0.05% to about 3%, for example about 0.1% to about 1%, by weight of the composition.

[0058] The compositions of the present invention optionally comprise an antiplaque (e.g., plaque disrupting) agent. One or more such agents can be present in an antiplaque effective total amount. Suitable antiplaque agents include without limitation stannous, copper, magnesium and strontium salts, dimethicone copolyols such as cetyl dimethicone copolyol, papain, glucoamylase, glucose oxidase, urea, calcium lactate,

calcium glycerophosphate, strontium polyacrylates and chelating agents such as citric and tartaric acids and alkali metal salts thereof.

[0059] The compositions of the present invention optionally comprise an anti-inflammatory agent. One or more such agents can be present in an anti-inflammatory effective total amount. Suitable anti-inflammatory agents include without limitation steroidal agents such as flucinolone and hydrocortisone, and nonsteroidal agents (NSAIDs) such as ketorolac, flurbiprofen, ibuprofen, naproxen, indomethacin, diclofenac, etodolac, indomethacin, sulindac, tolmetin, ketoprofen, fenoprofen, piroxicam, nabumetone, aspirin, diflunisal, meclofenamate, mefenamic acid, oxyphenbutazone and phenylbutazone. One or more anti-inflammatory agents are optionally present in the composition in an anti-inflammatory effective amount.

[0060] The compositions of the present invention optionally comprise an H_2 histamine receptor antagonist. H_2 antagonists useful herein include cimetidine, etintidine, ranitidine, ICIA-5165, tiotidine, ORF-17578, lupititidine, donetidine, famotidine, roxatidine, pifatidine, lamtidine, BL-6548, BMY-25271, zaltidine, nizatidine, mifentidine, BMY-52368, SKF-94482, BL-6341A, ICI-162846, ramixotidine, Wy-45727, SR-58042, BMY-25405, loxtidine, DA-4634, bisfentidine, sufotidine, ebrotidine, HE-30-256, D-16637, FRG-8813, FRG-8701, impromidine, L-643728, HB-408.4, and mixtures thereof.

[0061] The compositions of the present invention optionally comprise a desensitizing, or tooth sensitivity protecting, agent. One or more such agents can be present. Suitable desensitizing agents include without limitation potassium salts such as potassium citrate, potassium tartrate, potassium chloride, potassium sulfate and potassium nitrate. Another suitable desensitizing agent is sodium nitrate. Alternatively or in addition a local or systemic analgesic such as aspirin, codeine, acetaminophen, sodium salicylate or triethanolamine salicylate can be used. One or more desensitizing agents and/or analgesics are optionally present in a desensitizing and/or analgesic effective amount, typically about 0.05% to about 5%, for example about 0.1% to about 3% by weight, of the composition.

[0062] In some configurations, a tartar control agent can be, in non-limiting example, a dialkali or tetraalkali metal pyrophosphate salt such as $Na_4P_2O_7$, $K_4P_2O_7$, $Na_2K_2P_2O_7$, $Na_2H_2P_2O_7$ and $K_2H_2P_2O_7$; a long chain polyphosphate such as sodium

hexametaphosphate; and a cyclic phosphate such as sodium trimetaphosphate. In some configurations, a polyphosphate can be a β-phase calcium pyrophosphate, such as disclosed in US Patent 6,241,974 to White, Jr, et al., issued June 5, 2001.

[0063] In some configurations, a breath-freshening agent can be an odor-reducing agent. An odor reducing agent can be a sulfur precipitating agent. Non-limiting examples of sulfur-precipitating agents include metal salts, such as a copper salt and a zinc salt. Non-limiting examples of such salts include copper gluconate, zinc citrate and zinc gluconate.

[0064] The compositions of the present invention optionally comprise a nutrient. Suitable nutrients include vitamins, minerals, amino acids, and mixtures thereof. Vitamins include Vitamins C and D, thiamine, riboflavin, calcium pantothenate, niacin, folic acid, nicotinamide, pyridoxine, cyanocobalamin, para-aminobenzoic acid, bioflavonoids, and mixtures thereof. Nutritional supplements include amino acids (such as L-tryptophane, L-lysine, methionine, threonine, levocarnitine and L-carnitine), lipotropics (such as choline, inositol, betaine, and linoleic acid), fish oil (including components thereof such as omega-3 (N-3) polyunsaturated fatty acids, eicosapentaenoic acid and docosahexaenoic acid), coenzyme Q10, and mixtures thereof.

[0065] The compositions of the present invention optionally comprise proteins. Suitable proteins include milk proteins and enzymes such as peroxide-producing enzymes, amylase, plaque–disrupting agents such as papain, glucoamylase, and glucose oxidase.

[0066] The compositions of the present invention optionally comprise additional ingredients, such as, plaque buffers such as urea, calcium lactate, calcium glycerophosphate and strontium polyacrylates.

METHODS

[0067] In various embodiments, the present invention provides methods for coloring a tooth in a mammal. The mammal can be a human or a non-human higher order mammal such as a cat, dog, or horse, for example. The methods can comprise applying to a tooth, a tooth-coloring amount of a fluid comprising one or more cosmetic coloring agents and a film-forming natural resin system or synthetic polymer. In some compositions of the present invention, the synthetic polymer or natural resin is present at

a level of at least about 10%, at least about 15%, at least about 20%, at least about 25%, or 26%, or at least about 30%. In some embodiments, the natural resin is present at a level of at least 25%, or 26%, or at least about 30%. The tooth coating can be a fluid as described earlier herein. In some configurations, the coloring agents can comprise one or more white and/or pearlescent coloring agents. In a preferred embodiment, the white or pearlescent coloring agent comprises titanium oxide, mica titanium, or a white polymer as described herein.

[0068] Application of a fluid composition of the present invention can be accomplished using any suitable methods known in the art. For example, an applicator such as a brush can be dipped in a tooth-coating fluid described herein, and the fluid can then be painted onto a tooth. In addition to brush application, other non-limiting modes of application can comprise applying a rinse comprising a tooth-coating fluid, applying a semi-solid tooth-coating fluid from a stick resembling a lipstick, applying a semi-solid form using a crayon-like stick, spraying on the fluid, dabbing on the fluid using a towelette, or transferring the fluid from an adhesive strip. Following application of a fluid of the invention to targeted teeth, a tooth-adherent film comprising the natural resin system, a colorant, and a pearlescent particle can form. Adhesion of a film to a tooth can be promoted by allowing the fluid to dry following application to the tooth such that a film forms over the teeth. A film once formed can remain on the tooth for at least about one hour to about one year, from about one day to about six months, from about one week to about three months, or from about two weeks to about two months. A film formed on a tooth can be removed, for example, through friction, e.g., as provided by tooth brushing or mechanical scraping, or, in some embodiments, through application of a solvent, such as, for example, ethanol. In addition, in some configurations, application of a composition of the invention to a tooth can have a therapeutically beneficial effect, even without the presence of a therapeutic active in the composition, as the composition will prevent acids present in the oral cavity from contacting the tooth.

[0069] In certain embodiments, application of a fluid of the present invention to teeth requires no special equipment or training; for example, the fluid can be self-applied by an individual user, or applied by an esthetician. In some configurations, prior to application to targeted teeth, the teeth can be cleaned, e.g., through brushing, to promote good adhesion of the fluid. Alternatively, a dental professional such as a dental

hygienist or a dentist can clean the targeted teeth more thoroughly using professional equipment and methods prior to fluid application. Immediately following application, solvent comprised by the applied fluid can be removed, e.g., through evaporation, or polymerization of monomers to form polymer can be allowed to occur. In some configurations, a tooth-coating composition that is expected to endure for an extended period, for example, for six months after application, can be applied by a dental professional such as a dentist or a dental hygienist.

[0070] Certain embodiments of the present invention can be illustrated by the following non-limiting examples.

EXAMPLE 1

[0071] This Example illustrates a composition of the invention comprising a natural resin system with white and pearlescent pigments. In this example, a fluid comprising a mixture of the following substances can be provided in the designated amounts, as shown in Table 1:

Table 1

Substance	Amount (percentage w/w)
ethanol 96%	20.35
white beeswax	0.35
colophonium	23.35
sodium saccharin	0.50
mastic	8.61
shellac	15.67
flavor	0.47
Titanium oxide	14
Timiron®	16.7

EXAMPLE 2

[0072] This example illustrates a method of making the composition described in Example 1.

[0073] In this example, titanium dioxide in an amount of 14% (w/w) and a Timiron® mica titanium in an amount of 16.7% (w/w) are admixed with "Duraphat® Placebo" (Colgate-Palmolive Co.) at 69.3 % (w/w). Duraphat® Placebo is the tooth-adherent oral pharmaceutical sodium fluoride product Duraphat® prepared without sodium fluoride. The composition of Duraphat® Placebo is provided in Table 2.

Table 2

Substance	Amount (percentage w/w)
ethanol 96%	29.36
white beeswax	0.51
colophonium	33.7
sodium saccharin	0.72
mastic	12.42
shellac	22.61
flavor	0.68

EXAMPLE 3

[0074] This example illustrates an formulation for a resin mixture alternative to Duraphat® Placebo.

[0075] As shown in Table 3, Duraphat® Placebo, of the formulation presented in Table 2, can be replaced with a mixture of the formulation presented in Table 3. This formulation is expected to provide increased whiteness to the final composition (and to a user's teeth) compared to Duraphat® Placebo because a natural resin (shellac), which can be amber in color, is replaced with a colorless synthetic polymer (polyacrylate).

Table 3

Substance	Amount (percentage w/w)
ethanol 96%	29.36
white beeswax	0.51
colophonium	33.7
sodium saccharin	0.72
mastic	12.42
polyacrylate	22.61
flavor	0.68

[0076] The examples and other embodiments described herein are exemplary and not intended to be limiting in describing the full scope of compositions and methods of this invention. Equivalent changes, modifications and variations of specific embodiments, materials, compositions and methods may be made within the scope of the present invention, with substantially similar results.

WHAT IS CLAIMED:

1. A tooth coating comprising:

at least 10% by weight of a film forming natural resin system comprising at least two natural resins;

a colorant; and

pearlescent particles.

2. A tooth coating according to Claim 1, wherein said natural resin is selected from the group consisting of plant resins, animal resins, and combinations thereof.

3. A tooth coating according to Claim 2, wherein said natural resin system comprises at least one plant resin and at least one insect resin.

4. A tooth coating according to Claim 1, wherein at least one of said natural resins is selected from the group consisting of: dammars, East Indias, copals, accroides, elemi, mastic, sandarac, colophonium, shellac, and mixtures thereof.

5. A tooth coating according to Claim 1, wherein said natural resin is provided in a form selected from the group consisting of: unmodified natural resins, modified natural resins, synthetic natural resins, rosins, distillates, saps, oils, balsams, gums, subcomponents thereof, and mixtures thereof.

6. A tooth coating according to Claim 4, wherein said natural resin system comprises a mixture of colophonium, mastic, and shellac.

7. A tooth coating according to Claim 1, wherein said natural resin system comprises from about 10% up to about 95% by weight of said tooth coating.

8. A tooth coating according to Claim 7, wherein said natural resin system comprises from about 30% to about 60% by weight of said tooth coating.

9. A tooth coating according to Claim 1, further comprising a film forming polymer selected from the group consisting of: polyacrylates, polyacrylamides, polyvinylpyrollidones, polyvinyl alcohols, polyethylene glycols, polyethylene oxides, polystyrenes, hydroxypropylmethyl celluloses, hydroxypropyl celluloses, hydroxyethyl celluloses, methyl celluloses, carboxymethyl celluloses, copolymers, block copolymers, graft copolymers, cross-linked polymers, and combinations thereof.

10. A tooth coating according to Claim 1, wherein said colorant comprises a white colorant selected from the group consisting of titanium oxide, aluminum oxide, tin oxide, calcium oxide, magnesium oxide, zinc oxide, polyethylene, polypropylene, ethylene/propylene copolymer, polytetrafluoroethylene, polyhexafluoropropene, and mixtures thereof.

11. A tooth coating according to Claim 1, wherein said colorant comprises a non-white colorant selected from the group consisting of copper oxide, chromium oxide, ferric oxide, ultramarine blue, phthalocyanine green, FD&C Green No. 1 lake, FD&C Blue No. 2 lake, D&C Red No. 30 lake, FD&C Yellow No. 15 lake, FD&C Red No. 3, D&C Red No. 30, Food Red No. 17, disodium salt of 6-hydroxy-5-{(2-methoxy-5-methyl-4-sulphophenyl)azo}-2-naphthalenesulfonic acid, Food Yellow No. 13, sodium salt of a mixture of the mono and disulphonic acids of quinophthalone or 2-(2-quinolyl) indanedione, FD&C Yellow No. No. 5, FD&C Yellow No. 6, FD&C Green No. 3, FD&C Blue No. 1, FD&C Blue No. 2, and combinations thereof.

12. A tooth coating according to Claim 10, wherein said colorant comprises titanium oxide.

13. A tooth coating according to Claim 1, wherein said pearlescent particles are selected from the group consisting of bismuth oxychloride, nacre, mollusk shell, fish scale, pearl, silicates selected from the group consisting of mica, opal, and silica, and combinations thereof.

14. A tooth coating according to Claim 13, wherein said pearlescent particles further comprise a metal oxide coating wherein the metal oxide is selected from the group consisting of titanium oxide, iron oxide, aluminum oxide, tin oxide, copper oxide, calcium oxide, magnesium oxide, barium oxide, chromium oxide and combinations thereof.

15. A tooth coating according to Claim 14, wherein said pearlescent particles comprise mica titanium particles.

16. A tooth coating according to Claim 1, wherein said colorant is at a concentration of at least 1% by weight and said pearlescent particles are at a concentration of at least about 3% by weight.

17. A tooth coating according to Claim 1, wherein the tooth coating is a tooth coating fluid or veneer suitable for application to a surface selected from the group consisting of: natural hard dental surfaces, artificial hard dental surfaces, crowns, restorative veneers, partial dentures, composites, and combinations thereof.

18. A tooth coating composition comprising:

at least 10% of a film forming natural resin system comprising at least two natural resins;

a colorant; and

an active material.

19. A tooth coating according to Claim 18, wherein said natural resin is selected from the group consisting of: dammars, East Indias, copals, accroides, elemi, mastic, sandarac, colophonium, shellac, and mixtures thereof.

20. A tooth coating according to Claim 18, wherein said natural resin is provided in a form selected from the group consisting of: unmodified natural resins, modified natural resins, synthetic natural resins, rosins, distillates, saps, oils, balsams, gums, subcomponents thereof, and mixtures thereof.

21. A tooth coating according to Claim 19, wherein said natural resin system comprises a mixture of colophonium, mastic, and shellac.

22. A tooth coating according to Claim 18, wherein said colorant comprises a white colorant selected from the group consisting of titanium oxide, aluminum oxide, tin oxide, calcium oxide, magnesium oxide, zinc oxide, polyethylene, polypropylene, ethylene/propylene copolymer, polytetrafluoroethylene, polyhexafluoropropene, and mixtures thereof.

23. A tooth coating according to Claim 18, additionally comprising pearlescent particles selected from the group consisting of bismuth oxychloride, nacre, mollusk shell, fish scale, pearl, silicates selected from the group consisting of mica, opal, and silica, and combinations thereof.

24. A tooth coating according to Claim 18, wherein said active material is selected from the group consisting of: antimicrobials, anti-oxidants, anti-caries agents, anti-plaque agents, anti-calculus agents, bleaching agents, breath fresheners, anti-inflammatories, desensitizing agents, nutrients, proteins, and mixtures thereof.

25. A tooth coating composition comprising:

at least 10% of a natural resin system comprising colophonium, mastic, and shellac;

titanium dioxide; and

mica titanium.