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A cosmetic water-in-oil emulsion composition is provided which includes composite particles of a sunscreen agent and a condensation polymerized polyamide binder, an emulsifying silicone surfactant sufficient to form the water-in-oil emulsion, an oil phase and a water phase. The composition exhibits relatively high SPF photoprotection while maintaining excellent soft focus properties that hide skin imperfections.

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(54) Title: SUNSCREEN COMPOSITE PARTICLES DISPERSED IN WATER-IN-OIL COSMETIC COMPOSITIONS

(57) Abstract: A cosmetic water-in-oil emulsion composition is provided which includes composite particles of a sunscreen agent and a condensation polymerized polyamide binder, an emulsifying silicone surfactant sufficient to form the water-in-oil emulsion, an oil phase and a water phase. The composition exhibits relatively high SPF photoprotection while maintaining excellent soft focus properties that hide skin imperfections.

SUNSCREEN COMPOSITE PARTICLES DISPERSED IN WATER-IN-OIL COSMETIC COMPOSITIONS

The invention concerns cosmetic sunscreen compositions delivering UV protection and also soft focus properties.

Ultraviolet radiation can be damaging to skin. Immediate damage may be in the form of erythema. More long term is the concern of initiating cancerous growth. For these reasons, photoprotective agents known as sunscreens have been incorporated into cosmetic products.

Facial cosmetics desirably deliver not only photoprotection but also function to enhance overall skin appearance. Most persons have facial imperfections. These may include uneven tone, enlarged pores, fine lines and wrinkles.

Soft focus is an effect which can hide imperfect skin. Incoming light is distorted by scattering (lensing). Particulate components of the cosmetic operate as lenses to bend and twist light into a variety of directions.

US 5 997 890 (Sine et al.), US 5 972 359 (Sine et al.), and US 6 174 533 B1 (SaNogueira, Jr.) are all directed to topical compositions to provide good coverage of skin imperfections. The solution proposed by these documents is the use of a metal oxide with a refractive index of at least about two and a neat primary particle size of from 100 to 300 nm. Preferred particulates are titanium dioxide, zirconium oxide and zinc oxide.

US 2005/0163813 A1 (Kosbach et al.) reports use of fumed alumina particles for enhancing the soft-focus effect of certain cosmetic compositions.

Organic sunscreen agents can interfere with soft focus properties of a cosmetic formulation. This is especially noticeable with formulas having relatively high levels of organic phase and/or emulsions with continuous oil phase characteristics. Consequently, there is a challenge to provide cosmetics with a strong soft focus effect while maintaining a relatively high degree of photoprotective benefits for the composition.

SUMMARY OF THE INVENTION

A water-in-oil emulsion cosmetic composition is provided which includes:

(i) from 0.1 to 20% by weight of composite particles formed of an organic sunscreen agent and a condensation polymerized polyamide in a relative weight ratio of 5:1 to 1:10;

(ii) from 0.1 to 30% by weight of an emulsifying silicone surfactant sufficient to form the water-in-oil emulsion;

(iii) from 1 to 90% by weight of the composition of the composition of an oil phase; and

(iv) from 5 to 90% by weight of the composition of an aqueous phase.

DETAILED DESCRIPTION OF THE INVENTION

Now it has been found that a soft focus effect for hiding skin blemishes can co-exist with a sunscreen agent that can deliver a relatively high sunscreen protection factor (SPF). The invention requires an oil continuous phase emulsion known as a water-in-oil emulsion, especially achievable with an emulsifying silicone surfactant. Further the invention requires the presence of composite particles formed of organic sunscreen agent and a binder which is a condensation polymerized polyamide, especially a polyalkyleneoxypolyamide referred to as a "PAOPA Resin" or an ester-terminated poly(ester-amide) referred to as "ETPEA Resin".

Relative weight ratio of organic sunscreen agent to polyamide may range from 5:1 to 1:10, preferably from 3:1 to 1:8, more preferably from 2:1 to 1:7, optimally from 1:1 to 1:3. Amounts of the polyamide may range from 10% to 99.5% by weight of the composite particles. More preferably weight of the polyamide may range from 30% to 98%, optimally from 50 to 85% by weight of the composite particles. Amounts of the sunscreen agent may range from 0.5 to 90%, preferably from 2 to 70%, optimally from 30 to 50% by weight of the composite particles.

Amounts of the composite particles within the cosmetic emulsion composition may range from 0.1 to 30%, preferably from 2 to 15%, optimally from 4 to 10% by weight of the cosmetic composition.

Average particle size of the composite particles may range from 10 to 2,000 nm, preferably from 100 to 1,500 nm, and optimally from 200 to 1000 nm.

Sunscreen Composite Particles

Sunscreen particles of the present invention are formed as a composite of an organic sunscreen agent and a binder which is a condensation polymerization formed polyamide. Ester-terminated polyamides are most useful. Two examples are polyalkyleneoxypolyamide (PAOPA) and ester-terminated poly(ester-amide) (ETPEA) resins.

The polyalkyleneoxypolyamide resins useful herein are outlined in US 6 492 458 B1. These PAOPA materials may be prepared by combining reactants comprising a monocarboxylic acid compound, a diamine compound, and a dibasic acid. Specifics of these reactants are described hereinbelow. Commercially the resins are available from the Arizona Chemical Company under the trademark Sylvaclear™ PA 1200V, designated by a INCI nomenclature as Polyamide-3. Exemplary monocarboxylic acids of the formula R^1-COOH include, without limitation, stearic acid (C_{18}), 1-eicosanoic acid (C_{20}), 1-docasanoic acid (C_{22}, also known as behenic acid), dotricontanoic acid (C_{32}), tetratriacontanoic acid (C_{34}), pentatriacontanoic acid (C_{35}), tetracontanoic acid (C_{40}), tetraacontanioc acid (C_{44}), dopentaacontanoic acid (C_{54}), tetrahexaacontanoic acid (C_{64}) and dohexaacontanoic acid (C_{72}). These monocarboxylic acids are available from many commercial suppliers, including Aldrich Chemical (Milwaukee, Wis).

Another suitable monocarboxylic acid is the oxidized (specifically carboxyl terminated) polyethylene materials sold by Baker-Petrolite (Sugar Land, Tex.; division of Baker Hughes) as their UNICID™ acids. UNICID™ acids are fully saturated, linear carboxylic acids with average carbon chain lengths ranging from C_{24} to C_{50}. Acid values for UNICID™ acids vary from 60 to 115.

Still other suitable monocarboxylic acids are the alpha-branched carboxylic acids prepared by oxidizing higher molecular weight Guerbet alcohols. Such products are

available from Jarchem Industries Inc. (Newark, N.J.; wwwjarchem.com) as their JARIC™ acids. JARIC™ I-36 acid is a suitable monocarboxylic acid for the resins of this invention.

The diamine reactant has two amine groups, both of which are preferably primary amines, and is represented by the formula $HN(R^{2a})$-R^2-$N(R^{2a})H$. R^{2a} is preferably hydrogen, but may also be an alkyl group or may also join together with R^2 or another R^{2a} to form a heterocyclic structure. A preferred diamine is ethylene diamine, i.e. a diamine wherein R^{2a} is hydrogen and R^2 is $–CH_2CH_2$-.

Diamines other than ethylene diamine may be referred to herein as co-diamines. When present, co-diamines are preferably used in a minor amount compared to the ethylene diamine.

Exemplary co-diamines include 1,2-diaminopropane, 1,3-diaminopropane, 1,4-diaminobutane, 1,2-diamino-2-methylpropane, 1,3-diaminopentane, 1,5-diaminopentane, 2,3-dimethyl-1,3-propanediamine, 1,6-hexanediamine (also known as hexamethylenediamine, HMDA), 2-methyl-1,5-pentanediamine, 1,7-diaminoheptane, 1,8-diaminooctane, 2,5-dimethyl-2,5-hexandeiamine, 1,9-diaminononane, 1,10-diaminodecane, 1,12-diaminododecane, diaminophenanthrene (all isomers, including 9,10), 4,4'-methylenebis(cyclohexylamine), 2,7-diaminofluorene, phenylene diamine (1,3; 1,3 and/or 1,4 isomers), adamantane diamine, 2,4,6-trimethyl-1,3-phenylenediamine, 1,3-cyclohexanebis(methylamine), 1,8-diamino-p-menthane, 2,3,5,6-tetramethyl-1,4-phenylenediamine, diaminoaphthalene (all isomers, including 1,5; 1,8; and 2,3) and 4-amino-2,2,6,6-tetramethylpiperidine.

Suitable aromatic co-diamines (by which is meant molecules having two reactive, preferably primary amine groups ($-NH_2$) and at least one aromatic ring ("Ar") include xylene diamine and naphthalene diamine (all isomers).

Exemplary polyalkylene oxide-based co-diamines include without limitation, the JEFFAMINE™ diamines, i.e. poly(alkyleneoxy)diamines from Huntsman Chemical (Salt Lake City, Utah), also known as polyether diamines. Preferred polyalkylene oxide-containing co-diamines are the JEFFAMINE® ED, XTJ and D series diamines.

In certain embodiments the polyamide resins of the invention are prepared from co-diamine, where the co-diamine is selected from 1,6-hexanediamine, xylenediamine, 1,2-propanediamine, 2-methylpentamethylenediamine, and 1,12-dodecanediamine. Suitable diamines of the present invention are available from a number of commercial sources including Aldrich (Milwaukee, Wis.); EM Industries Inc. (Hawthorne, N.Y); Lancaster Synthesis Inc. (Windham, N.H) and Spectrum Quality Product Inc. (New Brunswisk, N.J).

The dibasic acid is an organic molecule containing two carboxylic acid groups or reactive equivalent thereof. A preferred dibasic acid is polymerized fatty acid, and in particular the dimer acid component of polymerized fatty acid. Polymerized fatty acid is typically a mixture of structures, including dimer acid and trimer acid, where individual dimer acids may be saturated, unsaturatred, cyclic, acyclic, and combinations thereof. Polymerized fatty acid is typically formed by heating long-chain unsaturated fatty acids, e.g. C_{18} monocarboxylic acids, to 200-250°C in the presence of a clay catalyst in order that the fatty acids polymerize. The product typically comprises dimer acid, i.e. C_{36} dicarboxylic acid formed by dimerization of the fatty acid, and trimer acid, i.e. C_{54} tricarboxylic acid formed by trimerization of the fatty acid. A more detailed discussion of fatty acid polymerization may be found in US 3 157 681.

Because fatty acid polymerization typically forms much more dimer acid than trimer acid, those skilled in the art may often refer to polymerized fatty acid as dimer acid, even though some trimer acid, and even higher polymerization products, may be present with the dimer acid. It is preferred that the polymerized fatty acid contain less than 20 weight percent of trimer acid, based on the total weight of the polymerized fatty acid, and that the dimer acid constitute at least 80 weight percent of the polymerized fatty acid. More preferably, the dimer acid constitutes essentially all of the polymerized fatty acid.

Typical unsaturated fatty acids used to form polymerized fatty acid include oleic acid, linoleic acid and linolenic acid. Tall oil fatty acid, which is a mixture containing long-chain unsaturated fatty acids obtained as a by-product of the wood pulping process, is preferred for preparing polymerized fatty acid.

Polymerized fatty acid may be hydrogenated prior to being used in the resin-forming reaction. Hydrogenation tends to provide for a slightly higher melting point and greater oxidative and color stability.

Polymerized fatty acid, dimer acid, and hydrogenated versions thereof may be obtained from a number of commercial suppliers. For example, Arizona Chemical (Jacksonville, Fla.) sells polymerized fatty acid under their UNDYME® trademark.

In addition to polymerized fatty acid, or reactive equivalents thereof, the dibasic acid may comprise a co-diacid. An exemplary co-diacid is a so-called "linear" diacid of the formula HOOC-R^1-COOH wherein R^1 is a linear C_{4-17} hydrocarbon gorup, and more preferably is a linear C_{6-8} hydrocarbon group. Linear co-diacids suitable for the present invention include 1,6-hexanedioic acid (adipic acid), 1,7-heptanedioic acid (pimelic acid), 1-8-octanedioic acid (suberic acid), 1,9-nonanedioic acid (azelaic acid), 1,10-decanedioic acid (sebacic acid), 1,11-undecanedioic acid, 1,12-dodecanedioic acid (1,10-decanedicarboxylic acid), 1,13-tridecanedioic acid (brassylic acid) and 1,14-tetradecanedioic acid (1,12-dodecanedicarboxylic acid).

Another exemplary co-diacid is the reaction product of acrylic or methacrylic acid (or the ester thereof, with a subsequent hydrolysis step to form an acid) and an unsaturated fatty acid. For example, a C_{21} diacid of this type may be formed by reacting acrylic acid with a C_{18} unsaturated fatty acid (e.g. oleic acid), where an ene-reaction presumably occurs between the reactants. An exemplary C_2, diacid is commercially available from Westvaco Corporation, Chemical Division, Charleston Heights, S.C. as their product number 1550.

Aromatic diacids may be used as the co-diacid. An "aromatic diacid" as used herein is a molecule having two carboxylic acid groups (-COOH) or reactive equivalents thereof (e.g. acid chloride (-COCl) or ester (-COOR) and at least one aromatic ring ("Ar"). Phthalic acids, e.g. isophthalic acid and terephthalic acid, are exemplary aromatic diacids.

In one aspect the resin is prepared with co-diacid and the co-diacid is selected from 1,4-cyclohexane dicarboxylic acid, isophthalic acid, adipic acid, azeleic acid, sebacic acid, and dodecandioic acid.

A second class of polyamides useful for this invention are the ester-terminated poly(ester-amide) resins. These are prepared by reacting components comprising dibasic acid, diamine, polyol and monoalcohol, wherein at least 50 equivalent percent of the dibasic acid comprises polymerized fatty acid; and at least 50 equivalent percent of the diamine comprises ethylene diamine. Typical dibasic acids and diamines have already been described hereinabove.

A further constituent of the ester-terminated poly(ester-amide) resins are the monoalcohol reactants. The monoalcohol may be represented by the formula R^3-OH, wherein R^3 is preferably a hydrocarbon group having at least ten carbon atoms. Thus the monoalcohol can also be described as a monohydric alcohol. In one aspect R^3 is a C_{10-30-} hydrocarbon, preferably a C_{12-24} hydrocarbon, still more preferably is a C_{16-22} hydrocarbon, and yet still more preferably is a C_{18} hydrocarbon. Preferably R^3 is linear, with the hydroxyl group located on a terminal carbon atoms, i.e. the monoalcohol is a primary monoalcohol. Thus 1-dodecanol, 1-tetradecanol, 1-hexadecanol (cetyl alcohol), 1-octadecanol (stearyl alcohol), 1-eicosanol (arachidyl alcohol) and 1-docosanol (behenyl alcohol) are preferred monoalcohols for preparing polyamide resin binders of the invention.

A final ingredient necessary in preparing an ETPEA resin of the present invention is polyol, which may also be referred to as polyhydric alcohol. The polyol is of the formula $R^4(OH)_n$ wherein R^4 is an n-valent organic group. For instance R^4 may be a C_2-C_{20} organic group without hydroxyl substitution. As another example R^4 may be a hydrocarbon. Typically n is selected from 2, 3, 4, 5 and 6. Suitable polyols for use in preparing an ETPEA resin of the present invention include ethylene glycol, propylene glycol, butylene glycol, glycerol, trimethylolpropane, pentaerythritol, neopentyl glycol, tris(hydroxylmethyl)methanol, di-pentaerythritol and tri-pentaerthyritol.

Preparation and description of the ETPEA resins are found in US 7 329 719. Commercially these resins are available from the Arizona Chemical Company under the trademark Sylvaclear AF 1900V. These resins are easily intimately mixed with OMC to form a composite particulate with photoprotective sunscreen.

Sunscreen agents can either be dispersed throughout the polyamide resin binder or can be formed as a core surrounded by binder. Dispersal throughout the binder is preferred.

Sunscreen agents according to this invention will have at least one chromophoric group absorbing within the ultraviolet ranging from 290 to 400 nm. Chromophoric organic sunscreen agents may be divided into the following categories (with specific examples) including: p-aminobenzoic acid, its salts and its derivatives (ethyl, isobutyl and glyceryl esters; p-dimethylaminobenzoic acid); anthranilates (o-aminobenzoates; methyl, menthyl, phenyl, benzyl, phenylethyl, linalyl, terpinyl and cyclohexenyl esters); salicylates (octyl, amyl, phenyl, benzyl, menthyl, glyceryl and dipropyleneglycol esters); cinnamic acid derivatives (menthyl and benzyl esters, alpha-phenyl cinnamonitrile; butyl cinnamoyl pyruvate); dihydroxycinnamic acid derivatives (umbelliferone, methylumbelliferone and methylaceto-umbelliferone); trihydroxycinnamic acid derivatives (esculetin, methylesculetin, daphnetin, and the glucosides, esculin and daphnin); hydrocarbons (diphenylbutadiene and stilbene); dibenzalacetone and benzalacetophenone; naphtholsulfonates (sodium salts of 2-naphthol-3,6-disulfonic and of 2-naphthol-6,8-disulfonic acids); dihydroxy-naphthoic acid and its salts; o- and p-hydroxybiphenyldisulfonates; coumarin derivatives (7-hydroxy, 7-methyl and 3-phenyl); diazoles (2-acetyl-3-bromoindazole, phenyl benzoxazole, methyl naphthoxazole and various aryl benzothiazoles); quinine salts (bisulfate, sulfate, chloride, oleate and tannate); quinoline derivatives (8-hydroxyquinoline salts and 2-phenylquinoline); hydroxy- or methoxy-substituted benzophenones; uric and vilouric acids; tannic acid and its derivatives (e.g. hexaethylether); (butyl carbityl) (6-propyl piperonyl) ether; hydroquinone; benzophenones (oxybenzone, sulisobenzone, dioxybenzone, benzoresorcinol, 2,2',4,4'-tetrahydroxybenzophenone, 2,2'-dihydroxy-4,4'-dimethoxybenzophenone and octabenzone); 4-isopropyldibenzoylmethane; butylmethoxydibenzoylmethane; etocrylene; and 4-isopropyl-dibenzoylmethane.

Particularly useful sunscreen agents are: 2-ethylhexyl p-methoxycinnamate, 4,4'-t-butyl methoxydibenzoylmethane, 2-hydroxy-4-methoxybenzophenone (known also as Benzophenone-3), octyldimethyl p-aminobenzoic acid, digalloyltrioleate, 2,2-dihydroxy-4-methoxybenzophenone, ethyl 4-[bis(hydroxypropyl)]aminobenzoate, 2-ethylhexyl-2-cyano-3,3-diphenylacrylate, 2-ethylhexylsalicylate, glyceryl p-aminobenzoate, 3,3,5-trimethylcyclohexylsalicylate, methylanthranilate, p-dimethylaminobenzoic acid or aminobenzoate, 2-ethylhexyl p-dimethylaminobenzoate, 2-phenylbenzimidazole-5-sulfonic acid, 2-(p-dimethylaminophenyl)-5-sulfoniobenzoxazoic acid, 4-methylbenzylidene camphor, bis-ethylhexyloxyphenol methoxyphenol triazine, methylene bis-benzotriazolyl tetramethylbutylphenol, dimethicodiethylbenzal malonate, isoamyl methoxycinnamate, octyl triazone, terephthalidene dicamphor sulfonic acid and mixtures thereof.

Cosmetic compositions of this invention may not only have sunscreen agent held within the composite particles but also an amount of sunscreen agent may be formulated free of binder within the composition. When present external of the composite, the sunscreen agent may be available in amounts from 0.1 to 25%, particularly from 2 to 15% by weight of the composition. Some preferred embodiments of this invention may be formulated without any sunscreen agent external to the composites or with only a relatively small amount of such material. For instance, external sunscreen agent may range in amount from 0 to 5%, preferably from 0.01 to 2%, and possibly from 0.01 to 0.8% by weight of the composition.

Water-in-Oil Silicone Surfactant

A wide variety of silicone surfactants are useful herein. These silicones are typically non-crosslinked organically modified organopolysiloxanes such as dimethicone copolyols.

Non-limiting examples of dimethicone copolyols and other silicone surfactants useful herein include polydimethylsiloxane polyether copolymers with pendant polyethylene oxide side chains, polydimethylsiloxane polyether copolymers with pendant polypropylene oxide side chains, polydimethylsiloxane polyether copolymers with pendant mixed polyethylenen oxide and polypropylene oxide side chains, polydimethylsiloxane polyether copolymers with pendant mixed poly(ethylene)(propylene)oxide side chains,

polydimethylsiloxane polyether copolymers with pendant organobetaine side chains, polydimethylsiloxane polyether copolymers with pendant carboxylate side chains, polydimethylsiloxane polyether copolymers with pendant quaternary ammonium side chains; and also further modifications of the preceding copolymers containing pendant (C_2-C_{30} straight, branched, or cyclic alkyl) moieties. Examples of commercially available dimethicone copolyols useful herein sold by Dow Corning Corporation are Dow Corning® 190, 193, Q2-5220, 2501 Wax, 2-5324 fluid, and 5225C (this latter material being sold as a mixture with cyclomethicone). Cetyl dimethicone copolyol is commercially available as a mixture with polyglyceryl-4 isostearate (and) hexyl laurate and is sold under the tradename ABIL® WS-08 (also available from Goldschmidt). Other non-limiting examples of dimethicone copolyols include lauryl dimethicone copolyol, dimethicone copolyol acetate, dimethicone copolyol adipate, dimethicone copolyolamine, dimethicone copolyol behenate, dimethicone copolyol butyl ether, dimethicone copolyol hydroxy stearate, dimethicone copolyol isostearate, dimethcione copolyol laurate, dimethicone copolyol methyl ether, dimethicone copolyol phosphate, dimethicone copolyol sulfosuccinate and dimethicone copolyol stearate. Most preferred is PEG-10 Dimethicone available from Shin Etsu.

Amounts of the silicone surfactant may range from 0.1 to 30%, preferably from 1 to 10%, optimally from 1.5 to 5% by weight of the composition.

Dispersed Aqueous Phase

The compositions of the present invention comprise from 5% to 90%, more preferably from 30% to 75%, and even more preferably from 45% to 60% of a dispersed aqueous phase. In emulsion technology, the term “dispersed phase” means that the phase exists as small particles or droplets suspended in and surrounded by a continuous phase.

The aqueous phase can be water, or a combination of water and one or more water soluble or dispersible ingredients. Non-limiting examples of such optional ingredients include but are not limited to thickeners, acids, bases, salts, chelants, gums, water-soluble or dispersible alcohols and polyols, buffers, preservatives and colorants.

Continuous Oil Phase

A continuous oil phase will be present in compositions of this invention. Amounts of the oil phase may range from 1 to 90%, preferably from 20 to 70%, optimally from 30 to 60% by weight of the composition.

Typical components of the oil phase may be silicones, hydrocarbons, triglycerides and combinations thereof. More specific materials are described hereinafter under the Optional Components section.

Optional Components

The composition of the present invention may contain a variety of other components to enhance physical properties and performance. These components may either constitute parts of the oil or the water phases.

A component optional to the present invention may be a crosslinked silicone (organopolysiloxane) elastomer. No specific restriction exists as to the type of curable organopolysiloxane composition that can serve as starting material for the crosslinked silicone elastomer. Examples in this respect are addition reaction-curing organopolysiloxane compositions which cure under platinum metal catalysis by the addition reaction between SiH-containing diorganopolysiloxane and organopolysiloxane having silicon-bonded vinyl groups; condensation-curing organopolysiloxane compositions which cure in the presence of an organotin compound by a dehydrogenation reaction between hydroxyl terminated diorganopolysiloxane and SiH-containing diorganopolysiloxane; condensation-curing organopolysiloxane compositions which cure in the presence of an organotin compound or a titanate ester, by a condensation reaction between a hydroxyl terminated diorganopolysiloxane and a hydrolyzable organosilane (this condensation reaction is exemplified by dehydration, alcohol-liberating, oxime-liberating, amine-liberating, amide-liberating, carboxyl-liberating, and ketone-liberating reactions); peroxide-curing organopolysiloxane compositions which thermally cure in the presence of an organoperoxide catalyst; and organopolysiloxane compositions which are cured by high-energy radiation, such as by gamma-rays, ultraviolet radiation or electron beams.

Ordinarily these materials are provided as a 1-30% crosslinked silicone elastomer dissolved or suspended in a dimethicone fluid (usually cyclomethicone). For purposes of definition "crosslinked silicone elastomer" refers to the elastomer alone rather than the total commercial compositions which also include a solvent (eg dimethicone) carrier.

Dimethicone/vinyl dimethicone crosspolymers and dimethicone crosspolymers are available from a variety of suppliers including Dow Corning (9040, 9041, 9045, 9506 and 9509), General Electric (SFE 839), Shin Etsu (KSG-15, 16 and 18 [dimethicone/phenyl vinyl dimethicone crosspolymer]) and Grant Industries (Gransil™ line of materials), and lauryl dimethicone/vinyl dimethicone crosspolymers supplied by Shin Etsu (e.g. KSG-31, KSG-32, KSG-41, KSG-42, KSG-43 and KSG-44).

Other suitable commercially available silicone elastomer powders include vinyl dimethicone/methicone silesquioxane crosspolymers from Shin-Etsu sold as KSP-100, KSP-101, KSP-102, KSP-103, KSP-104 and KSP-105, and hybrid silicone powders that contain a fluoroalkyl group or a phenyl group sold by Shin-Etsu as respectively KSP-200 and KSP-300.

The crosslinked silicone elastomers may range in concentration from 0.01 to 30%, preferably from 0.1 to 10%, optimally from 0.5 to 2% by weight of the cosmetic composition. These weight values exclude any solvent such as cyclomethicone found in commercial "elastomer" silicones such as the Dow Corning products 9040 and 9045. For instance, the amount of crosslinked silicone elastomer in 9040 and 9045 is between 12 and 13% by weight.

The optional components, when incorporated into the composition, should be suitable for use in contact with human keratinous tissue without undue toxicity, incompatibility, instability, allergic response and the like within the scope of sound judgment. The CTFA Cosmetic Ingredient Handbook, Second Edition (1992) describes a wide variety of non-limiting cosmetic and pharmaceutical ingredients commonly used in the skin care industry which are suitable for use in the compositions of the present invention. Examples of these classes include: abrasives, absorbents, aesthetic components such as fragrances, pigments, colorings/colorants, essential oils, skin sensates, astringents, etc.

(e.g. clove oil, menthol, camphor, eucalyptus oil, eugenol, menthyl lactate and witch hazel distillate), anti-acne agents, anti-caking agents, antifoaming agents, antimicrobial agents, antioxidants, biological additives, buffering agents, bulking agents, chelating agents, chemical additives, colorants, cosmetic astringents, cosmetic biocides, denaturants, drug astringents, external analgesics, film forming polymers, opacifying agents, pH adjusters, propellants, reducing agents, sequestrants, skin bleaching and lightening agents, skin conditioning agents, skin soothing and/or healing agents and derivatives, skin treating agents, thickeners and vitamins and derivatives thereof.

In any embodiment of the present invention, however, the actives useful herein can be categorized by the benefit they provide or by their postulated mode of action. However it is to be understood that the actives useful herein can in some instances provide more than one benefit or operate via more than one mode of action. Therefore classifications herein are made for the sake of convenience and are not intended to limit the active to that particular application or applications listed.

A safe and effective amount of an anti-oxidant/radical scavenger may be added in amounts from 0.01% to 10%, more preferably from 0.1% to 5% by weight of the composition.

Anti-oxidants/radical scavengers may be employed such as ascorbic acid (vitamin C) and its salts, ascorbyl esters of fatty acids, ascorbic acid derivatives (e.g. magnesium ascorbyl phosphate), tocopherol (vitamin E), tocopherol sorbate, tocopherol acetate, other esters of tocopherol, butylated hydroxy benzoic acids and their salts, 6-hydroxy-2,5,7,8-tetramethylchroman-2-carboxylic acid (commercially available under the tradename Trolor®), amines (e.g. N,N-diethylhydroxylamine, amino-guanidine), nordihydroguaiaretic acid, bioflavonoids, amino acids, silymarin, tea extracts and grape skin/seed extracts. Preferred anti-oxidants/radical scavengers are selected from esters of tocopherol, more preferably tocopherol acetate.

The compositions of the present invention may optionally comprise a flavonoid compound. Flavonoids are disclosed in US 5 686 082 and US 5 686 367. Examples of flavonoids particularly suitable flavones,

isoflavones, coumarins, chromones, discoumarols, chromanones, chromanols, isomers (e.g. cis/trans isomers) thereof and mixtures thereof.

Preferred for use are flavones and isoflavones, in particular daidzein (7,4'-dihydroxy isoflavone), genistein (5,7,4'-trihydroxy isoflavone), equol (7,4'-dihydroxy isoflavan), 5,7-dihydroxy-4'-methoxy isoflavone, soy isoflavones (a mixture extracted from soy) and mixtures thereof. Flavonoid compounds useful herein are commercially available from a number of sources, e.g. Indofine Chemical Company Inc., Stearloids Inc. and Aldrich Chemical Company Inc. The herein described flavonoid compounds are preferably present in from 0.01% to 20%, more preferably from 0.1% to 10%, and even more preferably from 0.5% to 5% by weight.

Anti-inflammatory agents useful herein include allantoin and compounds of the licorice (the plant genus/species Glycyrrhiza glabra) family, including glycyrrhetic acid, glycyrrhizic acid and derivatives thereof (e.g. salts and esters).

The compositions may comprise a tanning active. When present, it is preferable that the compositions comprise from 0.1% to 20%, more preferably from 2% to 7% by weight of the composition. A preferred tanning active is dihydroxyacetone.

The compositions may comprise a skin lightening agent. When used, the compositions preferably comprise from 0.1% to 10%, more preferably from 0.2% to 5%, also preferably from 0.5% to 2%, by weight of the composition, of a skin lightening agent. Suitable skin lightening agents include niacinamide, kojic acid, arbutin, tranexamic acid, placental extract, ascorbic acid and derivatives thereof (e.g. magnesium ascorbyl phosphate, sodium ascorbyl phosphate, ascorbyl glucoside and ascorbyl tetraisopalmitates). Other skin lightening materials suitable for use herein include Actiwhite® (Cognis), Emblica® (Rona), Azeloglicina (Sinerga) and extracts (e.g. mulberry extract).

The compositions may comprise an antimicrobial or antifungal active. Such actives are capable of destroying microbes, preventing the development of microbes or preventing the pathogenic action of microbes. A safe and effective amount of an antimicrobial or

antifungal active may be added to the present compositions, preferably, from 0.001% to 10%, more preferably from 0.01% to 5%, and even more preferably from 0.05% to 2% by weight of the composition.

Preferred examples of actives include those selected from the group consisting of salicylic acid, benzoyl peroxide, 3-hydroxy benzoic acid, glycolic acid, lactic acid, 4-hydroxy benzoic acid, acetyl salicylic acid, 2-hydroxybutanoic acid, 2-hydroxypentanoic acid, 2-hydroxyhexanoic acid, cis-retinoic acid, trans-retinoic acid, retinol, phytic acid, N-acetyl-L-cystein, lipoic acid, azelaic acid, arachidonic acid, benzoylperoxide, tetracycline, ibuprofen, naproxen, hydrocortisone, acetominophen, resorcinol, phenoxyethanol, phenoxypropanol, phenoxyisopropanol, 2,4,4'-trichloro-2'-hydroxy diphenyl ether, 3,4,4'-trichlorocarbanilide, octopirox, ciclopirox, lidocaine hydrochloride, clotrimazole, climbazole, miconazole, ketoconazole, neocycin sulfate and mixtures thereof.

The compositions may comprise a conditioning agent selected from the group consisting of humectants, moisturizers, or skin conditioners. A variety of these materials can be employed and each can be present at a level of from 0.01% to 40%, more preferably from 0.1% to 30%, and even more preferably from 0.5% to 15% by weight of the composition. These materials include, but are not limited to, guanidine; urea; glycolic acid and glycolate salts (e.g. ammonium and quaternary alkyl ammonium); lactic acid and lactate salts (e.g. ammonium and quaternary alkyl ammonium); aloe vera in any of its variety of forms (e.g., aloe vera gel); polyhydroxy compounds such as sorbitol, mannitol, glycerol, hexanetriol, butanetriol, propylene glycol, butylene glycol and hexylene glycol; polyethylene glycols; sugars and starch derivatives (e.g. alkoxylated glucose, fructose, sucrose and trehalose); hyaluronic acid; lactamide monoethanolamine; acetamide monoethanolamine; sucrose polyester; petrolatum; and mixtures thereof.

The compositions can comprise one or more thickening agents, preferably from 0.05% to 10%, more preferably from 0.1% to 5%, and even more preferably from 0.25% to 4%, by weight for the composition. Non-limiting classes of thickening agents include those selected from the group consisting of:

a. Carboxylic Acid Polymers

These polymers are crosslinked compounds containing one or more monomers derived from acrylic acid, substituted acrylic acids, and salts and esters of these acrylic acids and the substituted acrylic acids, wherein the crosslinking agent contains two or more carbon-carbon double bonds and is derived from a polyhydric alcohol.

Examples of commercially available carboxylic acid polymers useful herein include the Carbomers, which are homopolymers of acrylic acid crosslinked with allyl ethers of sucrose or pentaerytritol. The Carbomers are available as the Carbopol® 900 series from Noveon Corporation (e.g. Carbopol® 954). In addition other suitable carboxylic acid polymeric agents include copolymers of C_{10-30} alkyl acrylates with one or more monomers of acrylic acid, methacrylic acid, or one of their short chain (i.e. C_{1-4} alcohol) esters, wherein the crosslinking agent is an allyl ether of sucrose or pentaerytriotol. These copolymers are known as acrylates/C_{10-30} alkyl acrylate crosspolymers and are commercially available as Carbopol® 1342, Carbopol® 1382, Ultrez® 21, Pemulen® TR-1 and Pemulen® TR-2 from Noveon Corporation.

b. Taurate Polymers

The compositions of the present invention can optionally comprise crosslinked taurate polymers useful as thickeners or gelling agents including anionic, cationic and nonionic polymers. Examples include hydroxyethyl acrylate/sodium acryloyldimethyl taurate (e.g. Simulgel® NS and INS 100), acrylate/sodium acryloyldimethyl taurate (e.g. Simulgel® EG), sodium acryloyldimethyl taurate (e.g. Simulgel® 800) and ammonium acryloyldimethyl taurate/vinyl pyrrolidone (e.g. Aristoflex® AVC).

c. Polyacrylamide Polymers

The compositions of the present invention can optionally comprise vinyl polymerized polyacrylamide polymers, especially nonionic polyacrylamide polymers including substituted branched or unbranched polymers. Preferred among these polyacrylamide polymers is the nonionic polymer given the CTFA designation

polyacrylamide and isoparaffin and laureth-7, available under the tradename Sepigel® 305 from Seppic Corporation.

d. Polysaccharides

A wide variety of polysaccharides are useful herein. "Polysaccharides" refer to gelling agents that contain a backbone of repeating sugar (i.e. carbohydrate) units. Non-limiting examples of polysaccharide gelling agents include those selected from the group consisting of cellulose, carboxymethyl hydroxyethylcellulose, hydroxyethylcellulose, hydroxyethyl ethylcellulose, hydroxypropylcellulose, hydroxypropyl methylcellulose, methyl hydroxyethylcellulose, microcrystalline cellulose, sodium cellulose sulfate and mixtures thereof.

e. Gums and Clays

Other thickening and gelling agents useful herein include materials that are primarily derived from natural sources. Non-limiting examples include materials selected from the group consisting of acacia, agar, algin, alginic acid, ammonium alginate, amylopectin, calcium alginate, calcium carrageenan, carnitine, carrageenan, dextrin, gelatin, gellan gum, guar gum, guar hydroxypropyltrimonium chloride, hectorite, laponite, bentonite, hyaluronic acid, hydrated silica, hydroxypropyl chitosan, hydroxypropyl guar, karaya gum, kelp, locust bean gum, natto gum, potassium carrageenan, propylene glycol alginate, sclerotium gum, sodium carboxymethyl dextran, sodium carrageenan, tragacanth gum, xanthan gum and mixtures thereof.

The compositions of the present invention may contain one or more particulate materials. Non-limiting examples of particulate materials include colored and uncolored pigments, interference pigments, inorganic powders, organic powders, composite powders, optical brightener particles, and combinations thereof. Particulate materials may be present from 0.01% to 20%, more preferably from 0.05% to 10%, still more preferably from 0.1% to 5%, by weight of the composition.

Particulate materials useful herein include but are not limited to bismuth oxychloride, sericite, mica, mica treated with barium sulfate or titanium dioxide, zeolite, kaolin, silica,

boron nitride, lauroyl lysine, nylon, talc, styrene, polystyrene, ethylene/acrylic acid copolymer, aluminum oxide, silicone resin, barium sulfate, calcium carbonate, cellulose acetate, PTFE, polymethyl methacrylate, starch, modified starches, silk, glass and mixtures thereof. Preferred organic powders/fillers include polymeric particles chosen from the methylsilsesquioxane resin microspheres such as those sold by Toshiba Silicone under the name Tospearl™ 145A; microspheres of polymethylmethacrylates such as those sold by Seppic under the name Micropearl™ M 100; the spherical particles of crosslinked polydimethylsiloxanes, especially such as those sold by Dow Corning Toray Silicone under the name Trefil™ E 506C or Trefil™ E 505C; spherical particles of polyamide and more specifically Nylon™ 12, especially such as those sold by Atochem under the name Orgasol™ 2002N Nat C05; polystyrene microspheres such as those sold by Dyno Particles under the name Dynospheres™; ethylene acrylate copolymer sold by Kobo under the name FloBead™ EA209; PTFE™; polypropylene; aluminum starch octenylsuccinate such as sold by National Starch under the name Dry Flo™; microspheres of polyethylene such as those sold by Equistar under the name of Microthene™ FN 510-00; silicone resin; platelet shaped powder made from L-lauroyl lysine; and mixtures thereof. Especially preferred are spherical powders with an average primary particle size from 0.1 to 75 microns, preferably from 0.2 to 30 microns.

The topical compositions of the subject invention include but are not limited to lotions, milks, mousses, serums, sprays, aerosols, foams, sticks, pencils, gels, creams and ointments. The compositions may also be applied via a woven or nonwoven synthetic and/or natural fibered textile (wipe or towelette).

Except in the operating and comparative examples, or where otherwise explicitly indicated, all numbers in this description indicating amounts of material ought to be understood as modified by the word "about".

The term "comprising" is meant not to be limiting to any subsequently stated elements but rather to encom pass non-specified elements of major or minor functional importance. In other words the listed steps, elements or options need not be exhaustive. Whenever the words "including" or "having" are used, these terms are meant to be equivalent to "comprising" as defined above.

The following examples will more fully illustrate the embodiments of this invention. All parts, percentages and proportions referred to herein and in the appended claims are by weight unless otherwise illustrated.

EXAMPLES 1-4

The following are non-limiting examples of sunscreen compositions according to the present invention.

	Example (Weight %)			
	1	2	3	4
Phase A				
DC-9040™	8.60	3.00	37.00	5.00
Sylvaclear™ PA 1200V and OMC composite	4.00	6.50	--	--
Sylvaclear™ AF 1900V and OMC composite	--	--	4.00	6.50
Benzophenone-3	3.00	3.00	3.00	3.00
Polymethylsilsequioxane	4.00	4.00	4.00	4.00
Cyclomethicone	11.43	0.50	8.22	11.33
Dimethicone PEG-10/15 crosspolymer	5.37	5.25	2.75	5.40
Polyethylene wax	3.54	--	2.41	2.05
Fragrance	0.10	0.10	0.10	0.10
Titanium dioxide (coated with 5% dimethicone)	--	--	--	0.65
Titanium dioxide (coated mica coated with 6% methicone)	5.00	0.01	1.00	--
Phase B				
Glycerin	10.00	10.00	10.00	10.00
Dexpanthenol	0.50	0.50	0.50	0.50
Pentylene glycol	3.00	3.00	3.00	3.00
Hexamidine disethionate	0.10	0.10	0.10	0.10
Niacinamide	5.00	5.00	5.00	5.00
Methylparaben	0.20	0.20	0.20	0.20
Ethylparaben	0.05	0.05	0.05	0.05
Sodium citrate	0.20	0.20	0.20	0.20
Citric acid	0.03	0.03	0.03	0.03
Sodium benzoate	0.05	0.05	0.05	0.05
Sodium chloride	0.50	0.50	0.50	0.50
FD&C Red #40 (1%)	0.05	0.05	0.05	0.05
Water	Qs	Qs	Qs	Qs

The formulas in the examples are prepared in a suitable container first by combining the ingredients of phase A. In a separate suitable container, combine the ingredients of phase B. Heat each phase to 73C-78°C while mixing each phase using a suitable mixer (e.g. anchor blade, propeller blade, IKA T25) until each reaches temperature and is homogenous. Slowly add phase B to phase A while continuing to mix phase A. Continue mixing until batch is uniform. Pour product into suitable containers at 73-78°C and store at room temperature. Alternatively continuing to stir the mixture as temperature decreases results in lower observed hardness values at 21°C and 33°C.

EXAMPLE 5

A series of comparative experiments were conducted to demonstrate aspects of the present invention. These experiments are based upon testing of the formulas outlined under table I.

TABLE 1

	Formula (Weight %)							
Component	1	2	3	4	5	6	7	8
DC 9045 silicone elastomer blend	26.00	26.00	26.00	26.00	26.00	26.00	26.00	26.00
Cetyl alcohol	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Parsol™ MCX (octylmethoxy-cinnamate)	6.00	2.00	0.00	0.00	0.00	0.00	0.00	0.00
Caprylic/capric triglyceride	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
DC 200 (dimethicone)	--	2.00	4.00	4.00	4.00	4.00	4.00	2.00
DC 245 (cyclopentasiloxane)	--	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Silsoft 034 (caprylyl methicone)	2.00	2.00	2.00	2.00	2.00	2.00	2.00	2.00
Disteardimonium hectorite	0.40	0.40	0.40	0.40	0.40	0.40	0.40	0.40
PEG-10 dimethicone	2.60	2.60	2.60	2.60	2.60	2.60	2.60	2.60
Titanium dioxide	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Timiron MP-111 (mica coated with titanium dioxide)	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Glydant Plus liquid	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Disodium EDTA	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
UV Pearls™	--	--	--	5.50	--	--	--	--
Suncap 665™	--	--	--	--	9.50	--	--	--
Sylvaclear/PA 1200V™	--	--	--	--	--	4.00	--	--

composite (1:1 OMC)								
Sylvaclear PA1200V™ neat (no sunscreen)	--	--	--	--	--	--	4.00	4.00
Acetamide MEA	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
Glycerin	5.00	5.00	5.00	5.00	5.00	5.00	5.00	5.00
Glycol acid (70%)	5.71	5.71	5.71	5.71	5.71	5.71	5.71	5.71
Potassium hydroxide	6.24	6.24	6.24	6.24	6.24	6.24	6.24	6.24
Dequest 2006	0.49	0.49	0.49	0.49	0.49	0.49	0.49	0.49
Conjugated linoleic acid	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
Butylhydroxytoluene	0.20	0.20	0.20	0.20	0.20	0.20	0.20	0.20
Water, deionized	Bal	Bal	Bal	Bal	Bal	Bal	Bal	Bal

Optical Measurements

Opacity is the measure of intensity attenuation of a transmitted light beam shone perpendicular to a medium or film. The higher the direct beam attenuation, the greater will be the opacity. The source of the light beam attenuation is two fold: A) Some of the original light is reflected back from the film/medium. This gives the film/medium a true white/opaque appearance with great hiding power. Using pigment-grade TiO_2 in a formulation will give the effect. B) Some of the light is deflected from the straight beam path but still transmitted through the film/medium. In effect, the film/medium goes from being transparent to translucent, creating a "blurred" image. Another term for this is soft focus.

Procedure: Apply (or draw down) a 3 mil (76.2 μm) film of a formulation using a draw down bar on to a plastic overhead transparency sheet. Let the film dry for 2 hours at room temperature. Take the coated overhead transparency and place it in an Instrument Systems goniospectrophotometer. Set the light source and detector arrayed in a straight line perpendicular to the coated transparency. The light source (set at 209 million Watt-nm/cm^2, which serves as a reference for all Transmission Intensity Values reported herein) is turned on and the measurement of the transmitted light intensity is made. Further measurements are made by moving the detector 10, 30, 40 and 50 degrees away from the direct transmission normal. These values indicate the extent of soft focus light scattering. The Reflectance or "radiance" of a product is determined in the same way as opacity/soft focus light scattering, except for the positions of the light source and detector. The detector is 30 degrees on one side of the normal/perpendicular, while the light source is 20 degrees on the other side. To determine the extent of the intensity

attenuation, compare the intensity value to that of an uncoated overhead transparency. The difference between these two values is the extent of the attenuation or opacity.

SPF Measurements

Sun protection factor (SPF) was measured in vitro using an Optometrics™ SPF 290 instrument. The test procedure required calibration of the monochrometer and sample stage of the Optometrics SPF 290 instrument. Thereafter the instrument was calibrated with a blank sample quartz plate (10 cm x 10 cm and 3 mm thickness). Calibration zeros the UV detector. Formula is applied to a plate using an 1 mil draw-down applicator. This leaves a film of 2 mg/cm^2. The film is about to dry for 30 minutes. Subsquently an SPF reading is taken on the dried film using three measurements on different parts of the coated quartz plate and recording an average value.

Soft focus results with the formulations are reported in table II.

TABLE II

Transmission Intensity Values*

	Formula								
	1	2	3	4	5	6	7	8	Intensity Admisibility Range
Variable Component	6% External OMC	2% External OMC	0% OMC	UV Pearls™	SunCaps™ 664	Sylvaclear™ Composite (with OMC)	Sylvaclear™ (without OMC)	Sylvaclear™ (without OMC) and 2% External OMC	
Transmission Angle in Degrees									
0	7.1 M	6.5 M	6.0 M	6.2 M	6.4 M	4.6 M	5.3 M	6.2 M	4.0 to 7.0 million
10	1.0 M	1.0 M	1.5 M	1.4 M	1.4 M	18. M	1.6 M	1.3 M	1.0 to 2.0 million
30	115 K	122 K	131 K	123 K	122 K	139 K	134 K	128 K	120 to 140 thousand
40	56 K	63 K	70 K	62 K	63 K	79 K	73 K	68 K	60 to 80 thousand
50	37 K	42 K	51 K	44 K	43 K	60 K	54 K	48 K	40 to 60 thousand
Reflection Angle in Degrees									
30	138 K	143 K	151 K	153 K	150 K	164 K	155 K	146 K	140 to 170 thousand
SPF Value	15	8	4	15	15	20	4	8	

* Values are the Intensity of light scatter (units are W-nm/cm2)

All the composites (UV Pearls™, SunCaps™, Sylvaclear/Sunscreen) were formulated to deliver 2% octylmethoxycinnamate (OMC) to the overall cosmetic composition. UV Pearls™ is sold by the Rona Division of EMD Chemicals. Their preparation is described in US 7 264 795. UV Pearls™ are sold as particulates dispersed in an aqueous carrier; the particulates are octylmethoxycinnamate coated with silica, polyvinylpyrrolidone and minor functional ingredients. SunCaps™ are sold by Particle Sciences, Inc. of Bethlehem, Pennsylvania and described in US 5 733 531. These particles include octylmethoxycinnamate encapsulated in an binder that includes beeswax, carnauba wax, vinyl pyrrolidone/eicosene copolymer and emulsifiers. The encapsulates are supplied as an aqueous dispersion containing up to 65% solids.

The Sylvaclear polymer sunscreen composite in formula 6 (present invention) maintains the soft focus benefits of the 0% OMC Formulas and even improves on the high angle soft focus profile. A further benefit of formula 6 is that it still exhibits an SPF higher than 15. Opacity is improved (lowered) and Reflectance increased. All of this shifts the transmission soft focus curves and reflection to maximum performance within the Intensity Admissability range. By contrast formulas 4 and 5 containing UV Pearls™ and SunCaps™ have a negative impact on soft focus. Values are lower than the 0% OMC formula 3. Addition of the Sylvaclear resin alone along with external 2% OMC (not within a binder) as in formula 8 yields a slight improvement to the high angle soft focus and Reflectance relative to that of formula 2. However the SPF of 8 is identical for both formula 2 and 8. Contrast this to the much better soft focus, Reflectance and sunscreen activity (SPF of 20) of formula 6 that blends 2% OMC within the polymer composite.

CLAIMS

1. A cosmetic water-in-oil emulsion composition comprising:

(i) from 0.1 to 20% by weight of composite particles comprising organic sunscreen agent and a condensation polymerized polyamide in a relative weight ratio of 5:1 to 1 :10;

(ii) from 0.1 to 30% by weight of an emulsifying silicone surfactant sufficient to form the water-in-oil emulsion;

(iii) from 1 to 90% by weight of the composition of an oil phase; and (iv) from 5 to 90% by weight of the composition of water.

2. A composition according to claim 1 wherein sunscreen agent and polyamide are intimately mixed together to form each of the composite particles.

3. A composition according to claim 1 or claim 2 wherein the composite particles have an average particle size ranging from 10 to 2,000 nm.

4. A composition according to claim 3 wherein the composite particles have an average particle size ranging from 100 to 1,500 nm.

5. A composition according to any one of claims 1 to 4 wherein the polyamide is a polyalkyleneoxypolyamide resin.

6. A composition according to any one of claims 1 to 4 wherein the polyamide is an ester-terminated poly(ester-amide) resin.

7. A composition according to any one claims 1 to 6 wherein the sunscreen agent is selected from the group consisting of octylmethoxycinnamate, Benzophenone-3 and mixtures thereof.