

【DESCRIPTION】

【Invention Title】

ULTRAVIOLET LIGHT BLOCKING COMPOSITION COMPRISING BIS-
ETHYLHEXYLOXYPHENOL METHOXYPHENYL TRIAZINE COMPOSITE
5 FORMULATION

【Technical Field】

The present disclosure relates to a composition having excellent sun
protection efficiency.

Cross-Reference to Related Application

The present application claims priority to Korean Patent Application No.
10-2019-0057115 filed on May 15, 2019 and Korean Patent Application No. 10-
2020-0055952 filed on May 11, 2020 in the Republic of Korea, the disclosures
15 of which are incorporated herein by reference.

【Background Art】

It is shown that ultraviolet (UV) ray is a main cause of erythema, edema,
freckle, or the like on the skin and even skin cancer. Thus, many studies have
20 been conducted about various types of skin diseases caused by ultraviolet rays.
In general, UV is classified, depending on wavelength, into UVC having a
wavelength of 240-280 nm, UVB having a wavelength of 280-320 nm, and UVA
having a wavelength of 320-400 nm. Among them, it is known that UVC does

not arrive at the ground surface and disappears while passing through the ozone layer, UVB infiltrates to the skin epidermis to cause erythema, freckle, edema, or the like, and UVA infiltrates to the derma to cause aging, such as wrinkles and melanin formation, and skin irritation or skin cancer.

5 Recently, as UV irradiation to the earth surface is increased by the ozone depletion, the market of products mainly targeting sun protection is increased significantly every year, and needs of consumers to compositions for sun protection over the whole wavelength range tend to be increased.

 In general, a sun protection composition has been suggested as a
10 water-in-oil (W/O) type composition using oil as an external phase, or an oil-in-water (O/W) type composition using an aqueous phase as an external phase. In the case of an O/W type composition, it shows a higher fresh feeling of use upon the application to the skin as compared to a W/O type composition. However, although continuous studies have been conducted to improve the
15 water resistance, the O/W type composition still has a disadvantage in that it is easily washed out by sweat or water, and thus shows significantly lower durability of sun protection effect. On the contrary, in the case of a W/O type composition, it has higher durability as compared to an O/W type composition but is disadvantageous in that it shows a thick and sticky feeling of use. This
20 relates with the high viscosity of a general W/O type composition. In addition, the W/O type composition is provided with high viscosity by increasing the ratio of aqueous phase as an internal phase in order to provide a light feeling of use. Thus, the W/O type composition is disadvantageous in that it has lower emulsion stability as compared to the O/W type composition. On the other

hand, the W/O type composition having low viscosity causes separation of the aqueous phase as an internal phase from the oil phase as an external phase, when it is stored in a container for a long time during its distribution, and thus shows the problem of poor product stability. Therefore, viscosity of the W/O
5 type composition is increased to increase its stability, which causes the problem of a thick and sticky feeling of use.

Bis-ethylhexyloxyphenol methoxyphenyl triazine (BEMT) is an effective organic sunscreen agent capable of protecting UVA and UVB effectively at the same time. However, it shows low solubility to a solvent, and thus should be
10 applied to an oil phase, after being dissolved in another organic sunscreen agent capable of dissolving BEMT, oil having high polarity, or the like. Therefore, there has been a limitation in that it is difficult to apply bis-ethylhexyloxyphenol methoxyphenyl triazine to products having various formulations. In addition, when applying bis-ethylhexyloxyphenol
15 methoxyphenyl triazine to a composition, the composition shows a very glossy and sticky feeling of use. Thus, it is difficult to provide a product which can be applied with a light and fresh feeling of use as required by the consumers.

【Disclosure】

【Technical Problem】

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A technical problem to be solved by the present disclosure is to provide a composition having an excellent sun protection effect and a fresh and light feeling of use, while comprising a small amount of bis-ethylhexyloxyphenol methoxyphenyl triazine.

【Technical Solution】

In one general aspect, there is provided a water-in-oil (W/O) type sunscreen composition which comprises an aqueous phase part and an oil phase part, wherein the oil phase part comprises: microparticles comprising a polymer matrix in which bis-ethylhexyloxyphenol methoxyphenyl triazine is dispersed; and bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil.

【Advantageous Effects】

According to the embodiments of the present disclosure, the sunscreen composition comprises microparticles comprising a polymer matrix in which bis-ethylhexyloxyphenol methoxyphenyl triazine is dispersed, in combination with bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil. In this manner, bis-ethylhexyloxyphenol methoxyphenyl triazine is applied to the skin in the form of microparticles in combination with the form dissolved in oil, and thus can be distributed on the skin more homogeneously. Therefore, the sunscreen composition according to the present disclosure shows an improved sun protection effect, while comprising a smaller amount of bis-ethylhexyloxyphenol methoxyphenyl triazine, as compared to a composition comprising microparticles comprising a polymer matrix in which bis-ethylhexyloxyphenol methoxyphenyl triazine is dispersed alone, or a composition comprising bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil alone. In addition, the sunscreen composition according

to the present disclosure can provide a non-sticky and fresh feeling of use.

【Brief Description of Drawings】

FIG. 1A shows a scanning electron microscopic (SEM) image of the
5 bowl-like microparticles according to an embodiment of the present disclosure.

FIG. 1B shows an image of the same sample as FIG. 1A, taken at a
high magnification.

FIG. 2 illustrates the observation results of Example 2 / Example 5 /
Example 3 / Example 4 / Comparative Example 2 in the fourth week (low
10 temperature storage), in regular order viewed from the left side.

FIG. 3 illustrates the observation results of Example 2 / Example 5 /
Example 3 / Comparative Example 2 / Example 4 in the fourth week (room
temperature storage), in regular order viewed from the left side.

FIG. 4 illustrates the observation results of Comparative Example 2 /
15 Example 5 / Example 4 / Example 2 / Example 3 in the eighth week (stored in a
freezer after low temperature storage for 4 weeks), in regular order viewed from
the left side.

FIG. 5 illustrates the observation results of Comparative Example 2 /
Example 5 / Example 4 / Example 2 / Example 3 in the eighth week (room
20 temperature storage), in regular order viewed from the left side.

FIG. 6 illustrates the observation results of Comparative Example 2 /
Example 5 / Example 4 / Example 2 / Example 3 in the ninth week (low
temperature storage for 4 weeks + stored in a freezer for 4 weeks + room
temperature storage), in regular order viewed from the left side.

FIG. 7 illustrates the observation results of Comparative Example 2 / Example 5 / Example 4 / Example 2 / Example 3 after long-term storage (low temperature storage for 4 weeks + stored in a freezer for 4 weeks + room temperature storage for 1 year), in regular order viewed from the left side.

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【Best Mode】

Exemplary embodiments now will be described more fully hereinafter with reference to the accompanying drawings. This disclosure may, however, be embodied in many different forms and should not be construed as limited to the exemplary embodiments set forth therein. It will be apparent that these exemplary embodiments are provided so that the present disclosure will be complete and understood easily by those skilled in the art. In addition, it will be apparent to those skilled in the art that various changes and modifications may be made without departing from the spirit and scope of the disclosure as defined in the following claims.

In one aspect, there is provided a water-in-oil (W/O) type sunscreen composition comprising an aqueous phase part and an oil phase part. According to an embodiment, the oil phase part may comprise: microparticles comprising a polymer matrix in which bis-ethylhexyloxyphenol methoxyphenyl triazine is dispersed; and bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil.

In another aspect, there is provided use of microparticles comprising a polymer matrix in which bis-ethylhexyloxyphenol methoxyphenyl triazine is dispersed, and bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in

polar oil for the preparation of a sunscreen composition, wherein the composition is a water-in-oil (W/O) type sunscreen composition comprising an aqueous phase part and an oil phase part, and the microparticles comprising a polymer matrix in which bis-ethylhexyloxyphenol methoxyphenyl triazine is dispersed, and bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil may be comprised in the oil phase part. In still another aspect, there is provided a method for protecting the skin from UV rays, which comprises applying an effective amount of microparticles comprising a polymer matrix in which bis-ethylhexyloxyphenol methoxyphenyl triazine is dispersed, and bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil to a subject in need thereof, wherein the microparticles comprising a polymer matrix in which bis-ethylhexyloxyphenol methoxyphenyl triazine is dispersed, and bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil may be comprised in the oil phase part of a water-in-oil (W/O) type composition comprising an aqueous phase part and an oil phase part, and applied to the subject. In yet another aspect, there are provided microparticles comprising a polymer matrix in which bis-ethylhexyloxyphenol methoxyphenyl triazine is dispersed, and bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil, as active ingredients for use in a sunscreen composition, wherein the composition is a water-in-oil (W/O) type sunscreen composition comprising an aqueous phase part and an oil phase part, and the microparticles comprising a polymer matrix in which bis-ethylhexyloxyphenol methoxyphenyl triazine is dispersed, and bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil may be comprised in the oil phase part. According to an embodiment,

the above-mentioned use may be non-therapeutic use.

Bis-ethylhexyloxyphenol methoxyphenyl triazine as used herein is also referred to as another chemical name of 2,4-bis[4-(2-ethylhexyloxy)-2-hydroxyphenyl]-6-(4-methoxyphenyl)-1,3,5-triazine, is also called Bemotrinol, and has a CAS number of 187393-00-6. For example, bis-ethylhexyloxyphenol methoxyphenyl triazine is commercially available as Tinosorb S[®] from BASF. Although bis-ethylhexyloxyphenol methoxyphenyl triazine is known as an organic sunscreen agent capable of protecting UVA and UVB at the same time, it has poor solubility to a solvent, and thus is disadvantageous in that it should be provided after it is dissolved in polar oil or it is formed into microparticles. However, when bis-ethylhexyloxyphenol methoxyphenyl triazine is provided after being dissolved in polar oil, it is difficult to incorporate a large amount of bis-ethylhexyloxyphenol methoxyphenyl triazine to a composition due to a thick and sticky feeling of use. Thus, there is a problem in that a satisfactory sunscreen effect cannot be obtained. When bis-ethylhexyloxyphenol methoxyphenyl triazine is provided in the form of microparticles, its content is small due to the problem of precipitation. Thus, even when applying the microparticles uniformly to the skin, a portion where the particles are not applied is generated. Thus, there is a problem in that a satisfactory sunscreen effect cannot be obtained. On the contrary, according to the present disclosure, a material of bis-ethylhexyloxyphenol methoxyphenyl triazine stabilized in polymer microparticles and a small amount of bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil are used in combination. Thus, various types of bis-ethylhexyloxyphenol methoxyphenyl

triazine are distributed on the skin and applied compactly to the skin. Thus, it is possible to maximize a sun protection effect.

According to an embodiment of the present disclosure, the composition may comprise bis-ethylhexyloxyphenol methoxyphenyl triazine, in the form of bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil, in an amount of 0.01-2 wt% based on the total weight of the composition. When bis-ethylhexyloxyphenol methoxyphenyl triazine is comprised in an amount less than 0.01 wt% based on the total weight of the composition, it is not possible to provide a sufficient sun protection effect. When bis-ethylhexyloxyphenol methoxyphenyl triazine is comprised in an amount larger than 2 wt%, the content of polar oil is increased to cause a sticky and thick feeling of use, which is not suitable for the preparation of a composition, such as a W/S type composition, having a light feeling of use. Particularly, the composition may comprise bis-ethylhexyloxyphenol methoxyphenyl triazine, in the form of bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil, in an amount of 0.01 wt% or more, 0.05 wt% or more, 0.1 wt% or more, 0.2 wt% or more, 0.3 wt% or more, 0.4 wt% or more, 0.5 wt% or more, 0.6 wt% or more, 0.7 wt% or more, 0.8 wt% or more, 0.9 wt% or more, 1.0 wt% or more, 1.1 wt% or more, 1.2 wt% or more, 1.3 wt% or more, 1.3 wt% or more, 1.4 wt% or more, 1.5 wt% or more, 1.6 wt% or more, 1.7 wt% or more, 1.8 wt% or more, or 1.9 wt% or more, based on the total weight of the composition. In addition, the composition may comprise bis-ethylhexyloxyphenol methoxyphenyl triazine, in the form of bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil, in an amount of 2.0 wt% or less, 1.9 wt% or less, 1.8 wt% or less, 1.7 wt%

or less, 1.6 wt% or less, 1.5 wt% or less, 1.4 wt% or less, 1.3 wt% or less, 1.2 wt% or less, 1.1 wt% or less, 1.0 wt% or less, 0.9 wt% or less, 0.8 wt% or less, 0.7 wt% or less, 0.6 wt% or less, 0.5 wt% or less, 0.4 wt% or less, 0.3 wt% or less, 0.2 wt% or less, 0.1 wt% or less, 0.05 wt% or less, or 0.02 wt% or less, based on the total weight of the composition.

According to an embodiment of the present disclosure, the polar oil in which bis-ethylhexyloxyphenol methoxyphenyl triazine is dissolved is not particularly limited and any polar oil may be used, as long as it can provide bis-ethylhexyloxyphenol methoxyphenyl triazine in a state dissolved stably therein without precipitation even after long-term storage. Polarity of oil is determined by the presence/absence, types or number of functional groups present in each oil, or the structure of the corresponding substance. In general, linear alcohols, esters and vegetable oil having hydrophilic functional groups are classified as high-polarity oil. For example, the polar oil may comprise oil comprising at least one polar functional group selected from carboxyl (-COO), ketone (-CO) and hydroxyl (-OH) groups. Particularly, the polar oil may be any one selected from butylene glycol dicaprylate·dicapriate, ethylhexyl salicylate, ethylhexyl methoxycinnamate, homosalate, C12-15 alkyl benzoates, dibutyl adipate, dicaprylyl carbonate, caprylyl-caprylate, cococaprylate, octocrylene, propylheptyl caprylate, isopropyl palmitate, caprylic/capric triglyceride and cocoglyceride. More particularly, the polar oil may comprise at least one oil selected from butylene glycol dicaprylate·dicapriate, C12-15 alkyl benzoates and dicaprylyl carbonate, which show a less thick feeling of use as compared to other types of oil and provide high solubility to bis-ethylhexyloxyphenol

methoxyphenyl triazine.

According to an embodiment of the present disclosure, the composition may comprise microparticles comprising a polymer matrix in which bis-ethylhexyloxyphenol methoxyphenyl triazine is dispersed, in an amount of 0.1-

5 30 wt% based on the total weight of the composition. When the composition comprises the microparticles in an amount less than 0.1 wt% based on the total weight of the composition, it is not possible to provide a sufficient sun protection effect. When the composition comprises the microparticles in an amount

larger than 30 wt% based on the total weight of the composition, such an
10 excessive content of microparticles, i.e. powder formulation, may cause a stuffy feeling of use. Particularly, the composition may comprise the microparticles in

an amount of 0.1 wt% or more, 0.5 wt% or more, 1.0 wt% or more, 2.0 wt% or more, 3.0 wt% or more, 4.0 wt% or more, 5.0 wt% or more, 6.0 wt% or more, 7.0 wt% or more, 8.0 wt% or more, 9.0 wt% or more, 10 wt% or more, 11 wt%

15 or more, 12 wt% or more, 13 wt% or more, 14 wt% or more, 15 wt% or more, 16 wt% or more, 17 wt% or more, 18 wt% or more, 19 wt% or more, 20 wt% or more, 21 wt% or more, 22 wt% or more, 23 wt% or more, 24 wt% or more, 25 wt% or more, 26 wt% or more, 27 wt% or more, 28 wt% or more, or 29 wt% or more, based on the total weight of the composition. In addition, the

20 composition may comprise the microparticles in an amount of 30 wt% or less, 29 wt% or less, 28 wt% or less, 27 wt% or less, 26 wt% or less, 25 wt% or less, 24 wt% or less, 23 wt% or less, 22 wt% or less, 21 wt% or less, 20 wt% or less, 19 wt% or less, 18 wt% or less, 17 wt% or less, 16 wt% or less, 15 wt% or less, 14 wt% or less, 13 wt% or less, 12 wt% or less, 11 wt% or less, 10 wt% or less,

9 wt% or less, 8 wt% or less, 7 wt% or less, 6 wt% or less, 5 wt% or less, 4 wt% or less, 3 wt% or less, 2 wt% or less, 1 wt% or less, or 0.5 wt% or less, based on the total weight of the composition.

According to an embodiment of the present disclosure, the
5 microparticles may be at least one of nonporous microparticles and porous microparticles. As used herein, the term “nonporous” refers to particles having no pores or voids therein and such particles may have a surface porosity of 0 or approximately 0. According to an embodiment of the present disclosure, the microparticles may have a spherical shape or semi-spherical shape, and may
10 have a bowl-like shape. Otherwise, the microparticles may comprise at least one of spherical, semi-spherical and bowl-like microparticles. As used herein, the term “bowl-like” covers any concave bowl or container shape regardless of the internally dented degree or external bowl shape. For example, the bowl-like shape may be a round concave bowl shape, more particularly a semi-
15 spherical concave bowl shape. According to an embodiment of the present disclosure, the microparticles used herein may comprise bowl-like nonporous microparticles. According to an embodiment, the bowl-like microparticles may be nonporous. The bowl-like nonporous microparticles have higher particle durability as compared to the conventional porous microparticles, and can
20 disperse hardly soluble bis-ethylhexyloxyphenol methoxyphenyl triazine very stably in the formulation.

According to an embodiment of the present disclosure, the microparticles may have an average diameter of 1-10 μm but are not limited thereto, as long as they can be dispersed stably in the composition formulation,

while comprising a high content of bis-ethylhexyloxyphenol methoxyphenyl triazine therein. The average diameter of microparticles is the average value of particles comprised in the composition and is determined through hydrodynamic volume, provided that particles are spherical. Particularly, 30 mL of isotone (Beckman Coulter) is introduced to a 100 mL container, and a small amount of microparticles and dispersant solution (10% of Triton X-100) are added to the container. Then, the resultant solution is dispersed with a 150 W sonicator and particle size analysis is carried out by using Multisizer 4 (Beckman Coulter). The analysis results are shown as median values (d_{50} 3.5-5.5 μm) in the nearest tenth unit. More particularly, the microparticles may have an average diameter of 1 μm or more, 2 μm or more, 3 μm or more, 4 μm or more, 5 μm or more, 6 μm or more, 7 μm or more, 8 μm or more, 9 μm or more, or 9.9 μm or more, and 10 μm or less, 9 μm or less, 8 μm or less, 7 μm or less, 6 μm or less, 5 μm or less, 4 μm or less, 3 μm or less, 2 μm or less, or 1.1 μm or less. Specifically, the microparticles may have an average diameter of 1-8 μm , more specifically 2-6 μm .

According to an embodiment of the present disclosure, bis-ethylhexyloxyphenol methoxyphenyl triazine comprised in the microparticles is not crosslinked into the polymer matrix, particularly the polymeric crosslinked structure of the polymer matrix, but is dispersed homogeneously in a form near molecular units in the network structure formed by the crosslinked structure. Particularly, bis-ethylhexyloxyphenol methoxyphenyl triazine is not crosslinked with the polymeric crosslinked structure of the polymer matrix in the polymeric crosslinked structure, but may be mixed and dispersed homogeneously in a

form near molecular units in the network structure formed by the crosslinked structure. The other ingredients comprised in the polymer matrix may be any ingredients with no particular limitation, as long as they allow preparation of microparticles. For example, the polymer matrix comprised in the bowl-like
5 nonporous microparticles may comprise bis-ethylhexyloxyphenol methoxyphenyl triazine, and polymerizate of polymerizable monomers with a multi-functional crosslinking agent. More particularly, the microparticles may be prepared by dispersion polymerization using an oil phase comprising all of bis-ethylhexyloxyphenol methoxyphenyl triazine, polymerizable monomers and
10 a multi-functional crosslinking agent.

According to an embodiment of the present disclosure, the microparticles may be obtained in different shapes depending on the ratio of bis-ethylhexyloxyphenol methoxyphenyl triazine comprised therein. In this context, the bowl-like microparticles according to an embodiment of the present
15 disclosure may comprise bis-ethylhexyloxyphenol methoxyphenyl triazine in an amount of 20-30 wt% based on the total weight of the microparticles. More particularly, the bowl-like microparticles may comprise bis-ethylhexyloxyphenol methoxyphenyl triazine in an amount of 20 wt% or more, 21 wt% or more, 22 wt% or more, 23 wt% or more, 24 wt% or more, 25 wt% or more, 26 wt% or
20 more, 27 wt% or more, 28 wt% or more, 29 wt% or more, or 29.9 wt% or more, and 30 wt% or less, 29 wt% or less, 28 wt% or less, 27 wt% or less, 26 wt% or less, 25 wt% or less, 24 wt% or less, 23 wt% or less, 22 wt% or less, 21 wt% or less, or 20.1 wt% or less, based on the total weight of the microparticles.

According to an embodiment of the present disclosure, the

polymerizable monomer may be any radical polymerizable monomer with no particular limitation, as long as it is copolymerizable with the multifunctional crosslinking monomer. Particularly, the polymerizable monomer may be a radical polymerizable monomer comprising one ethylene group. For example,

5 the polymerizable monomer may comprise at least one radical polymerizable monomer selected from the group consisting of: at least one aromatic vinyl monomer selected from the group consisting of styrene, methylstyrene, ethylstyrene, fluorostyrene, chlorostyrene and vinyltoluene; and at least one acrylic vinyl monomer selected from the group consisting of methyl
10 (meth)acrylate, ethyl (meth)acrylate, butyl (meth)acrylate, octyl (meth)acrylate, stearyl (meth)acrylate, benzyl (meth)acrylate and glycidyl (meth)acrylate.

According to an embodiment of the present disclosure, the multifunctional crosslinking agent may be any monomer capable of crosslinking of the polymerizable monomer with no particular limitation. Particularly, the

15 crosslinking agent may be a crosslinking agent comprising two or more ethylene groups. For example, the crosslinking agent may comprise at least one crosslinking agent selected from the group consisting of divinylbenzene, ethylene glycol dimethacrylate, diethylene glycol dimethacrylate, triethylene glycol dimethacrylate, trimethylene propane trimethacrylate, 1,3-butanediol
20 dimethacrylate, 1,6-hexanediol dimethacrylate and tri(meth)acrylate.

According to an embodiment of the present disclosure, the polymerizate may be methyl methacrylate crosspolymer formed by radical polymerization between methyl methacrylate and ethylene glycol dimethacrylate, and may have a random network structure.

The weight ratio of the polymerizable monomer to the multifunctional crosslinking agent may be varied depending on a desired crosslinking degree with no particular limitation. For example, the multifunctional crosslinking agent may be blended in an amount of 0.1-100 wt%, particularly 1-50 wt%, and
5 more particularly 1-25 wt%, based on 100 wt% of the polymerizable monomer.

According to an embodiment of the present disclosure, the composition may be a water-in-oil (W/O) type composition. More particularly, the composition may be a water-in-silicone oil (W/S) type composition. As used herein, the term "W/S type" means an emulsion comprising oil essentially
10 comprising silicone oil, as a continuous phase, and a water-containing dispersed phase therein. In other words, the W/S type composition means an emulsion comprising a water-containing internal aqueous phase dispersed in a silicone oil-containing external oil phase. Although preference of the W/S type composition tends to be increased by virtue of its fresh feeling of use, it shows a
15 disadvantage in that bis-ethylhexyloxyphenol methoxyphenyl triazine cannot be applied to the W/S type composition due to the significantly low solubility of bis-ethylhexyloxyphenol methoxyphenyl triazine itself to silicone-based oil. Under these circumstances, the present disclosure solves the above-mentioned problem by providing bis-ethylhexyloxyphenol methoxyphenyl triazine in the
20 form of microparticles and in the form dissolved in polar oil. According to the present disclosure, bis-ethylhexyloxyphenol methoxyphenyl triazine may be applied to the external phase of the W/O type or W/S type composition at a higher content as compared to the related art.

The W/S type composition according to an embodiment of the present

disclosure may comprise at least one silicone-based oil selected from dimethicone, cyclomethicone, phenyl trimethicone, polydimethyl siloxane, methyl phenyl polysiloxane, methyl cyclopolsiloxane, octamethyl cyclotetrasiloxane, decamethyl cyclopentasiloxane, dodecamethyl cyclohexasiloxane, tetradecamethyl hexasiloxane and octamethyl trisiloxane.

According to an embodiment of the present disclosure, the composition may comprise the silicone-based oil in an amount of 15-60 wt%, particularly 15-50 wt%, and more particularly 20-40 wt%, based on the total weight of the composition, but is not limited thereto. According to an embodiment of the present disclosure, the composition may comprise water in the balance amount.

In the W/S type cosmetic composition according to an embodiment of the present disclosure, the composition may further comprise a silicone-based surfactant comprising at least one of polyethylene glycol (PEG), polypropylene glycol (PPG) and polyglyceryl group. Particularly, the composition according to

an embodiment of the present disclosure may use PEG-added silicone-based surfactant with a view to stable dispersion of microparticles comprising bis-ethylhexyloxyphenol methoxyphenyl triazine and prevention of precipitation of bis-ethylhexyloxyphenol methoxyphenyl triazine in the form of crystals at the interface. Particular examples of the PEG-added silicone-based surfactant

may comprise PEG/PPG-18/18 dimethicone (cyclopentasiloxane and PEG/PPG-18/18 dimethicone), PEG-30 dipolyhydroxystearate, PEG-7 dimethicone, PEG-10 dimethicone, cyclopentasiloxane/PEG.PPG-19.19 dimethicone, sorbitan isostearate, lauryl PEG.PPG-18.18 methicone, cetyl PEG.PPG-10.1 dimethicone, lauryl PEG-9 polydimethylsiloxyethyl dimethicone,

or the like. In addition, the composition according to an embodiment of the present disclosure may use at least one of the above-mentioned PEG-added silicone-based surfactant, but is not limited thereto. More particularly, the PEG-added silicone-based surfactant may be a nonionic surfactant having a hydrophile-lipophile balance (HLB) of 1-6. For example, the surfactant may be used in an amount of 0.01-10 wt%, particularly 1-8 wt%, and more particularly 3-6 wt%, based on the total weight of the composition. When the surfactant is used in an amount less than 0.01 wt%, dispersibility of the microparticles may be degraded. When the surfactant is used in an amount larger than 10 wt%, stickiness may be caused to reduce a fresh feeling of use.

The aqueous phase part of the W/S type composition according to an embodiment of the present disclosure may comprise at least one of water and ethanol, and may also comprise any other ingredients that may be incorporated generally to an aqueous phase part.

According to an embodiment of the present disclosure, the composition is a cosmetic composition. For example, the cosmetic composition may be formulated with a cosmetically or dermatologically acceptable medium or base. This covers any formulation suitable for local application and may be provided in the form of a solution, gel, solid, dry kneaded product, emulsion obtained by dispersing an oil phase in an aqueous phase, suspension, microemulsion, microcapsules, microgranules or ionic (liposome) and non-ionic sachet dispersant, or provided as cream, skin, lotion, powder, ointment, spray or conceal stick. In addition, the cosmetic composition may be used in the form of foam or an aerosol composition further comprising a compressed propellant.

Such formulations may be obtained by the method generally known to those skilled in the art.

According to an embodiment of the present disclosure, the sun protection factor (SPF) of the composition may be 10-50 or more, as calculated according to the following formula 1. The protection grade of UVA (PA) may be PA+ to PA++++.

[Formula 1]

Sun protection factor = (Minimal erythema dose at the skin site to which cosmetic composition is applied) / (Minimal erythema dose at the skin site to which no cosmetic composition is applied)

According to an embodiment of the present disclosure, the composition may further comprise an organic sunscreen agent or inorganic sunscreen agent depending on purposes. Each of the organic sunscreen agent or inorganic sunscreen agent may be used in an amount of 0.01-20 wt% based on the total weight of the composition, but is not limited thereto. Particularly, the organic sunscreen agent may comprise octylmethoxy cinnamate, octyl salicylate, octocrylene, butylmethoxy dibenzoylmethane, oxybenzone, octyltriazole, methylantranilate, 3,4-methylbenzylidene camphor, isoamyl-P-methoxycinnamate, methylene bisbenzotriazole tetramethylbutylphenol, or the like. In addition, the inorganic sunscreen agent may comprise titanium dioxide, zinc oxide, iron oxide, zinc oxide powder, or the like.

According to an embodiment of the present disclosure, the composition may comprise the active ingredient in combination with the other ingredients with the proviso that the other ingredients do not adversely affect the main effect

or can provide a synergic effect with the main effect. The ingredients other than the active ingredient according to the present disclosure may be selected and combined with ease by those skilled in the art depending on the formulation or purpose of use of the composition. In addition to the above-mentioned ingredients, the composition according to an embodiment of the present disclosure may further comprise other ingredients used currently in a cosmetic composition, if necessary. For example, such ingredients comprise a moisturizing agent, emollient, thickener, organic and inorganic pigments, organic powder, preservative, sterilizing agent, antioxidant, plant extract, pH modifier, alcohol, colorant, fragrance, blood flow-stimulating agent, coolant, anti-perspirant, purified water, or the like. Such ingredients that may be incorporated to the composition according to the present disclosure are not limited to the above-described ingredients. In addition, the ingredients may be used without detracting from the objects and effects of the present disclosure.

【Modes for Invention】

Hereinafter, the present disclosure will be explained in more detail with reference to Examples, Comparative Examples and Test Examples. The following examples and experiments are for illustrative purposes only. In addition, it will be apparent to those skilled in the art that the scope of the present disclosure is not limited to the following Examples, Comparative Examples and Test Examples.

[Preparation Example 1] Preparation of Microparticles Comprising Bis-

Ethylhexyloxyphenyl Methoxyphenyl Triazine

To a reaction container, 9 g of polyvinyl alcohol was introduced and dissolved in 2000 g of distilled water to prepare an aqueous phase. Next, 200 g of methyl methacrylate (MMA) and 25 g of ethylene glycol dimethacrylate were introduced to an emulsifier and agitated therein for 5 minutes, and then 75 g of bis-ethylhexyloxyphenol methoxyphenyl triazine (BEMT) was further introduced thereto and dissolved for 30 minutes to prepare an oil phase. Then, 3 g of 2,2'-azobis-(2,4-dimethylvaleronitrile) as an initiator was introduced and mixed therewith. After that, the aqueous phase was introduced to the emulsifier and dispersion polymerization was carried out for 30 minutes by using the emulsifier, and then the reaction mixture was warmed to carry out reaction at 50°C for 15 hours. The resultant multi-dispersed microparticles were dehydrated by using a depressurized filter and washed with water three times, followed by vacuum drying. In this manner, bowl-like multi-dispersed microparticles (FIG. 1A and FIG. 1B) comprising 25 wt% of bis-ethylhexyloxyphenol methoxyphenyl triazine was obtained (yield = 90%, average diameter of microparticles = 2 μ m).

[Test Example 1] Comparison of Clinical Sun Protection Effect Test Results Depending on Formulation of Bis-Ethylhexyloxyphenyl Methoxyphenyl Triazine

According to an embodiment of the present disclosure, a composition comprising: microparticles comprising a polymer matrix comprising bis-ethylhexyloxyphenol methoxyphenyl triazine dispersed therein; and bis-

ethylhexyloxyphenol methoxyphenyl triazine (Tinosorb®) dissolved in polar oil, in the oil phase part, was prepared according to the following composition. Particularly, bis-ethylhexyloxyphenol methoxyphenyl triazine (Tinosorb®) was dissolved completely in C12-C15 alkyl benzoate*titanium oxide*aluminum stearate*polyhydroxystearic acid*alumina as polar oil, while carrying out heating to 80°C, and then cooled. The ingredients of oil phase part other than the above-mentioned ingredients were added sequentially to the container and mixed, and then bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil was introduced to the container comprising the ingredients of oil phase part, followed by homogeneous dispersion and dissolution. In a separate container, the ingredients of aqueous phase part were mixed and dissolved, and then introduced to the container comprising the ingredients of oil phase part, while carrying out emulsification by using a homogenizer, thereby providing a W/S type sunscreen composition (Example 1) with a sun-milk formulation.

As a comparative example, a W/S type sunscreen composition (Comparative Example 1) with a sun-milk formulation was prepared in the same manner as Example 1, except that bis-ethylhexyloxyphenol methoxyphenyl triazine (Tinosorb®) dissolved in polar oil was not used, and the other ingredients of oil phase part were introduced sequentially to silicone oil and dissolved and dispersed therein without heating.

[Table 1]

		Example 1	Comp. Ex. 1
Oil	Ethylhexylmethoxy cinnamate*BHT	7	7

phase part	Ethylhexyl salicylate KSCI:Octyl salicylate	4	4
	Bis-ethylhexyloxyphenol methoxyphenyl triazine (Tinosorb S®)	1	-
	Dimethicone	15	15
	Cyclopentasiloxane*Cyclohexasilosane	Balance	Balance
	C12-15 Alkyl benzoate*C12-15 Alcohols	6	6
	Disteardimonium hectorite	0.3	0.3
	PEG-10 Dimethicone	1.5	1.5
	Tocopherol*Lauryl PEG-9 Polydimethylsiloxylethyl dimethicone	1.5	1.5
	Prep. Ex. 1 (bowl-like multi-dispersed microparticles comprising 25 wt% of bis- ethylhexyloxyphenol methoxyphenyl triazine)	8	12
	C12-C15 Alkyl benzoate*Titanium oxide*Aluminum stearate*Polyhydroxystearic acid*Alumina	5	5
Aqueou s phase part	Zinc oxide*Hydrogen dimethicone*PEG-10 dimethicone*Cyclopentasiloxane	11	11
	Zinc oxide*Tirethoxycaprylylsilane	2.5	2.5
	Distilled water	15	15
	Polyol	5	5
	Sodium chloride	1	1
	2Na EDTA	0.05	0.05
	Preservative	1.15	1.15
	Ethanol	5	5
Total weight (wt%)		100	100
Test result (n=3)		Average SPF 41.1	Average SPF 22.6
		Average PFA 8.1	Average PFA 7.7

Evaluation of Sun Protection Factor (SPF)

Ultraviolet rays were irradiated to the back site of a subject, while adjusting the light dose of UV rays emitted from a solar simulator lamp to the test site to 20-100 mJ/cm². Then, 24 hours after the UV irradiation, minimal erythema dose (MED) was determined.

To determine the sun protection effect of each sample (Example 1 and Comparative Example 1), 0.1 g of each sample was applied homogeneously to the back of the subject to a thickness of 2 μL/cm², and allowed to stand for 15 minutes so that the sample might be dried. A UV irradiation window was attached and fixed to each site where the sample was applied, and UV rays were irradiated, while the sites other the irradiation window were protected from UV rays by using leather and towel.

Based on MED of the subject (SPF 50), UV rays were irradiated and the test was carried out while increasing the UV irradiation dose. Then, 24 hours after the UV irradiation, the minimal erythema dose was determined and the sun protection effect was calculated according to the following Formula 2. The results are shown in Table 1.

[Formula 2]

Sun protection factor = (Minimal erythema dose at the skin site to which the composition is applied) / (Minimal erythema dose at the skin site to which no composition is applied)

Evaluation of UVA Protection Factor (PFA)

Ultraviolet rays were irradiated to the back site of a subject, while

adjusting the light dose of UVA (320-400 nm) emitted from a solar simulator lamp to the test site to 6.40-19.54 J/cm². Then, 24 hours after the UVA irradiation, minimal persistent pigment darkening dose (MPPDD) was determined.

5 To determine the UVA protection effect of each sample (Example 1 and Comparative Example 1), 0.1 g of each sample was applied homogeneously to the back of the subject to a thickness of 2 µL/cm², and allowed to stand for 15 minutes so that the sample might be dried. A UV irradiation window was attached and fixed to each site where the sample was applied, and UV rays
10 were irradiated, while the sites other than the irradiation window were protected from UV rays by using leather and towel.

Based on MPPDD of the subject (PFA 8), UVA was irradiated and the test was carried out while increasing the UVA irradiation dose. Then, 24 hours after the UVA irradiation, the minimal persistent pigment darkening dose was
15 determined and the UVA protection effect was calculated according to the following Formula 3. The results are shown in Table 1.

[Formula 3]

UVA protection factor = (Minimal persistent pigment darkening dose at the skin site to which the composition is applied) / (Minimal persistent pigment
20 darkening dose at the skin site to which no composition is applied)

After the test, as shown in Table 1, it can be seen from the SPF and PFA values determined from the clinical test that Example 1 shows a sun protection effect approximately twice higher than the sun protection effect of

Comparative Example 1, even though Example 1 and Comparative Example 1 comprise the same content of bis-ethylhexyloxyphenol methoxyphenyl triazine. Thus, this suggests that the composition according to the present disclosure has an excellent sun protection effect.

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[Test Example 2] Comparison of Stability of Bis-Ethylhexyloxyphenyl Methoxyphenyl Triazine

The following test was carried out to determine whether bis-ethylhexyloxyphenol methoxyphenyl triazine was precipitated or not in the dissolved form of bis-ethylhexyloxyphenol methoxyphenyl triazine used according to the present disclosure, depending on type of polar oil. When polar oil capable of dissolving bis-ethylhexyloxyphenol methoxyphenyl triazine sufficiently is not used, precipitation of bis-ethylhexyloxyphenol methoxyphenyl triazine occurs, and thus it cannot function as a sunscreen agent.

15 To carry out the test, the oil phase part of a W/S type composition was prepared according to the composition of the following Table 2. Herein, the content of each ingredient is shown in the unit of wt% based on the total weight (100 wt%) of the composition comprising both the aqueous phase part and the oil phase part. In the test, a clear oil phase is required to perform comparison of the solubility of bis-ethylhexyloxyphenol methoxyphenyl triazine. Thus, any powder comprising an inorganic sunscreen agent affecting the turbidity of the composition was excluded. Therefore, the total weight becomes 58 wt% in the following Table 2. Particularly, bis-ethylhexyloxyphenol methoxyphenyl triazine (Tinosorb®) was dissolved in ethylhexyl methoxy cinnamate+BHT and ethylhexyl

salicylate KSCl:octyl salicylate, while carrying out heating to 80°C, and then cooled. The ingredients of oil phase part other than the above-mentioned ingredients were added to the container and mixed, and then bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil was introduced to the container comprising the ingredients of oil phase part, followed by homogeneous dispersion and dissolution. As a comparative example, Comparative Example 2 was prepared in the same manner as described above.

[Table 2]

		Comp. Ex. 2	Ex. 2	Ex. 3	Ex. 4	Ex. 5
Oil phase part	Trisiloxane·dimethicone	5	2	2	2	3
	Butylene glycol dicaprylate·dicapriate	-	6	-	-	3
	C12-C15 Alkyl benzoate	-	-	6	-	-
	Dicaprylyl carbonate	-	-	-	6	-
	Caprylyl methicone·phenyl trimethicone	4	4	4	4	4
	Diphenylsiloxypheyl trimethicone	4	4	4	4	4
	Dimethicone·trisiloxane	6	3	3	3	5
	Trimethylsiloxysilicate·cycl opentasiloxane	3	3	3	3	3
	Ethanol	5	5	5	5	5
	PEG-10 dimethicone	1.5	1.5	1.5	1.5	1.5
	Tocopherol·lauryl PEG-9 polydimethylsiloxylethyl dimethicone	2	2	2	2	2
	Cyclopentasiloxane·cycloh exasiloxane	Balanc e	Balanc e	Balanc e	Balanc e	Balanc e
	C12-C15 Alkyl benzoate	4	4	4	4	4
	Ethylhexyl methoxy	7	7	7	7	7

	cinnamate+BHT					
	Ethylhexyl salicylate KSCI:octyl salicylate	4	4	4	4	4
	Bis-ethylhexyloxyphenol methoxyphenyl triazine (Tinosorb S®)	2	2	2	2	2
	Total weight (wt%)	58	58	58	58	58

While each of Comparative Example 2 and Examples 2-5 was stored at low temperature (4°C) or in a frozen state, whether precipitation of bis-ethylhexyloxyphenol methoxyphenyl triazine occurred or not, i.e. whether the state of bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved stably in the oil phase part was maintained or not, was observed. Right after the preparation of each composition, Example 2 and Example 3 were relatively transparent, and the other compositions were translucent. On the next day at room temperature, the compositions other than Example 2 were translucent. After the lapse of 5 days at room temperature, Example 2 and Example 3 were transparent but the other compositions were translucent. After the lapse of 3 weeks (in the fourth week), the samples stored at room temperature were transparent and showed high stability (FIG. 3). Even after the lapse of 7 weeks (in the eighth week), the samples stored at room temperature were transparent and showed high stability (FIG. 5). In the samples stored at low temperature from the next day, Comparative Example 2 showed precipitation of bis-ethylhexyloxyphenol methoxyphenyl triazine crystals. In the other samples, turbidity appeared in the order of Example 4 > Example 3 > Example 5 > Example 2. Thus, Example 2 showed the highest stability (FIG. 2). After the

samples stored at low temperature were frozen after the lapse of 4 weeks and then thawed in the fifth week, Comparative Example 2 showed precipitation of a large amount of bis-ethylhexyloxyphenol methoxyphenyl triazine crystals, while Example 5 showed precipitation of a small amount of bis-ethylhexyloxyphenol methoxyphenyl triazine crystals. In the case of Example 2 and Example 4, each showed a turbidity similar to the turbidity after the lapse of 3 weeks. After the lapse of 8 weeks, in the case of samples stored in a freezer (stored at low temperature for 4 weeks + stored in a freezer for 4 weeks), precipitation of bis-ethylhexyloxyphenol methoxyphenyl triazine crystals occurred in the order of Comparative Example 2 >> Example 5 > Example 4 and Example 2 > Example 3 (FIG. 4). In the case of samples thawed after the lapse of 8 weeks (stored at low temperature for 4 weeks + stored in a freezer for 4 weeks) and stored at room temperature, in the ninth week, Comparative Example 2 showed precipitation of a large amount of bis-ethylhexyloxyphenol methoxyphenyl triazine crystals, and Example 5 showed precipitation of a small amount of bis-ethylhexyloxyphenol methoxyphenyl triazine crystals (FIG. 6). FIG. 7 illustrates the samples thawed after the lapse of 8 weeks (stored at low temperature for 4 weeks + stored in a freezer for 4 weeks) and stored at room temperature for 1 year. Herein, Comparative Example 2 and Example 5 showed precipitation of a large amount of bis-ethylhexyloxyphenol methoxyphenyl triazine crystals, while Example 4, Example 2 and Example 3 showed no precipitation even after the long-term storage.

As a result, BEMT dissolved in oil shows high stability at room temperature right after the preparation thereof. However, different samples

show a difference in BEMT solubility at low temperature/in a frozen state. This suggests that it is required to add at least a predetermined amount of polar oil capable of increasing the solubility of BEMT in an oil phase, besides ethylhexyl methoxy cinnamate and ethylhexyl salicylate used for dissolution of BEMT in the oil phase, in order to ensure the solubility of BEMT in the oil phase stably under various conditions.

[Test Example 3] Evaluation of Skin Safety

To determine the skin safety of the composition according to an embodiment of the present disclosure, a patch test was carried out for 18 female adults and 12 male adults (average age: 32.5) having a normal skin state. Particularly, each of the compositions according to Example 1 and Comparative Example 1 obtained from Test Example 1 was allowed to be in direct contact with the skin of each test subject through a patch, and then the patch was removed after the lapse of 28 hours. After 30 minutes, the first judgement was carried out. In addition, after the lapse of 96 hours, the second judgement was carried out. The following Table 3 shows the results of the second judgement. Particularly, to determine the skin irritation intensity of each of Example 1 and Comparative Example 1, weight was imparted depending on degree of positive reaction of the skin to obtain the average skin reaction level, and skin irritation caused by each sample was judged by the naked eyes. Herein, the judgement was carried out based on a 5-point scale, wherein a point of 1 or less (Grade I) means no irritation, a point of 1 or higher and less than 3 (Grade II) means light irritation, a point of 3 or higher and less

than 5 (Grade III) means medium irritation, and a point of 5 or higher (Grade IV) means strong irritation. The average skin reaction level was calculated according to the following Formula 4.

[Formula 4]

$$\text{Average skin reaction level} = \frac{\sum \text{Grade} \times \text{number of subjects showing reaction} \times 100}{4(\text{Maximum grade}) \times n(\text{total number of subjects}) \times 2(\text{judge point})}$$

[Table 3]

	Skin reaction level	Judge grade
Example 1	0	No irritation
Comparative Example 1	0	No irritation

After the test, as shown in Table 3, the composition according to an embodiment of the present disclosure was judged to have excellent skin safety.

According to the present disclosure, the following embodiments may be provided.

According to the first embodiment, there is provided a water-in-oil (W/O) type sunscreen composition comprising an aqueous phase part and an oil phase part, wherein the oil phase part comprises: microparticles comprising a polymer matrix in which bis-ethylhexyloxyphenol methoxyphenyl triazine is dispersed; and bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil.

According to the second embodiment, there is provided the composition as defined in the first embodiment, wherein the microparticles are comprised in

an amount of 0.1-30 wt% based on the total weight of the composition.

According to the third embodiment, there is provided the composition as defined in the first or the second embodiment, wherein bis-ethylhexyloxyphenol methoxyphenyl triazine, in the form of bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil, is comprised in an amount of 0.01-2 wt% based on the total weight of the composition.

According to the fourth embodiment, there is provided the composition as defined in any one of the first to the third embodiments, wherein the polar oil comprises oil comprising at least one polar functional group selected from carboxyl (-COO), ketone (-CO) and hydroxyl (-OH) groups.

According to the fifth embodiment, there is provided the composition as defined in any one of the first to the fourth embodiments, wherein the polar oil comprises at least one oil selected from butylene glycol dicaprylate*dicapriate, ethylhexyl salicylate, ethylhexyl methoxycinnamate, homosalate, C12-15 alkyl benzoates, dibutyl adipate, dicaprylryl carbonate, caprylyl-caprylate, cococaprylate, octocrylene, propylheptyl caprylate, isopropyl palmitate, caprylic/capric triglyceride and cocoglyceride.

According to the sixth embodiment, there is provided the composition as defined in any one of the first to the fifth embodiments, wherein the microparticles are bowl-like nonporous microparticles.

According to the seventh embodiment, there is provided the composition as defined in any one of the first to the sixth embodiments, wherein the microparticles comprises bis-ethylhexyloxyphenol methoxyphenyl triazine in an amount of 20-30 wt% based on the total weight of the microparticles.

According to the eighth embodiment, there is provided the composition as defined in any one of the first to the seventh embodiments, wherein the microparticles have an average diameter of 1-10 μm .

According to the ninth embodiment, there is provided the composition as
5 defined in any one of the first to the eighth embodiments, wherein the polymer matrix comprises bis-ethylhexyloxyphenol methoxyphenyl triazine, and polymerizate of polymerizable monomers with a multi-functional crosslinking agent.

According to the tenth embodiment, there is provided the composition as
10 defined in any one of the first to the ninth embodiments, wherein the polymerizable monomer comprises at least one selected from the group consisting of: at least one aromatic vinyl monomer selected from the group consisting of styrene, methylstyrene, ethylstyrene, fluorostyrene, chlorostyrene and vinyltoluene; and at least one acrylic vinyl monomer selected from the
15 group consisting of methyl (meth)acrylate, ethyl (meth)acrylate, butyl (meth)acrylate, octyl (meth)acrylate, stearyl (meth)acrylate, benzyl (meth)acrylate and glycidyl (meth)acrylate.

According to the eleventh embodiment, there is provided the composition as defined in any one of the first to the tenth embodiments, wherein
20 the multifunctional crosslinking agent comprises at least one selected from the group consisting of divinylbenzene, ethylene glycol dimethacrylate, diethylene glycol dimethacrylate, triethylene glycol dimethacrylate, trimethylene propane trimethacrylate, 1,3-butanediol dimethacrylate, 1,6-hexanediol dimethacrylate and tri(meth)acrylate.

According to the twelfth embodiment, there is provided the composition as defined in any one of the first to the eleventh embodiments, wherein the aqueous phase part comprises at least one of water and ethanol.

According to the thirteenth embodiment, there is provided the
5 composition as defined in any one of the first to the twelfth embodiments, which is a water-in-silicon oil (W/S) type composition.

According to the fourteenth embodiment, there is provided the composition as defined in any one of the first to the thirteenth embodiments, which has a sun protection factor (SPF) of 30 or higher.

【CLAIMS】

【Claim 1】

A water-in-oil (W/O) type sunscreen composition comprising an aqueous phase part and an oil phase part, wherein the oil phase part comprises:
5 microparticles comprising a polymer matrix in which bis-ethylhexyloxyphenol methoxyphenyl triazine is dispersed; and bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil.

【Claim 2】

10 The composition according to claim 1, wherein the microparticles are comprised in an amount of 0.1-30 wt% based on the total weight of the composition.

【Claim 3】

15 The composition according to claim 1, wherein bis-ethylhexyloxyphenol methoxyphenyl triazine, in the form of bis-ethylhexyloxyphenol methoxyphenyl triazine dissolved in polar oil, is comprised in an amount of 0.01-2 wt% based on the total weight of the composition.

20 【Claim 4】

The composition according to claim 1, wherein the polar oil comprises oil comprising at least one polar functional group selected from carboxyl (-COO), ketone (-CO) and hydroxyl (-OH) groups.

【Claim 5】

The composition according to claim 1, wherein the polar oil comprises at least one oil selected from butylene glycol dicaprylate-dicapriate, ethylhexyl salicylate, ethylhexyl methoxycinnamate, homosalate, C12-15 alkyl benzoates, 5 dibutyl adipate, dicaprylryl carbonate, caprylyl-caprylate, cococaprylate, octocrylene, propylheptyl caprylate, isopropyl palmitate, caprylic/capric triglyceride and cocoglyceride.

10 **【Claim 6】**

The composition according to claim 1, wherein the microparticles are bowl-like nonporous microparticles.

【Claim 7】

15 The composition according to claim 1, wherein the microparticles comprises bis-ethylhexyloxyphenol methoxyphenyl triazine in an amount of 20-30 wt% based on the total weight of the microparticles.

【Claim 8】

20 The composition according to claim 1, wherein the microparticles have an average diameter of 1-10 μm .

【Claim 9】

The composition according to claim 1, wherein the polymer matrix comprises bis-ethylhexyloxyphenol methoxyphenyl triazine, and polymerizate of polymerizable monomers with a multi-functional crosslinking agent.

5 **【Claim 10】**

The composition according to claim 9, wherein the polymerizable monomer comprises at least one selected from the group consisting of: at least one aromatic vinyl monomer selected from the group consisting of styrene, methylstyrene, ethylstyrene, fluorostyrene, chlorostyrene and vinyltoluene; and
10 at least one acrylic vinyl monomer selected from the group consisting of methyl (meth)acrylate, ethyl (meth)acrylate, butyl (meth)acrylate, octyl (meth)acrylate, stearyl (meth)acrylate, benzyl (meth)acrylate and glycidyl (meth)acrylate.

【Claim 11】

15 The composition according to claim 9, wherein the multifunctional crosslinking agent comprises at least one selected from the group consisting of divinylbenzene, ethylene glycol dimethacrylate, diethylene glycol dimethacrylate, triethylene glycol dimethacrylate, trimethylene propane trimethacrylate, 1,3-butanediol dimethacrylate, 1,6-hexanediol dimethacrylate
20 and tri(meth)acrylate.

【Claim 12】

The composition according to claim 1, wherein the aqueous phase part

comprises at least one of water and ethanol.

【Claim 13】

The composition according to claim 1, which is a water-in-silicon oil
5 (W/S) type composition.

【Claim 14】

The composition according to claim 1, which has a sun protection factor
(SPF) of 30 or higher.

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