Title: COSMETIC COMPOSITION COMPRISING A PARTICULAR SILICONE COPOLYMER, A VOLATILE SOLVENT AND METAL PARTICLES

Abstract: The present inventions relate to a keratin fibre treatment composition comprising one or more copolymers based on silicone resin and on fluid silicone, one or more volatile solvents, and one or more metal particles. Coatings are thus obtained on the keratin fibres that give the particularly aesthetic coloured coatings on the hair.
The present invention relates to a composition for colouring keratin fibres, and in particular human keratin fibres such as the hair, and also to a process for colouring keratin fibres using this composition.

It is known practice to provide coatings on the hair comprising pigments, these pigments thus being used as a mixture with film-forming polymers such as particular silicone copolymers based on silicone resin and fluid silicone, more commonly known as BioPSA. These copolymers are especially described in patent applications WO 03/026 596, WO 2004/073 626, WO 2007/051 505 and WO 2007/051 506 for various cosmetic applications such as application to the hair, the nails and the skin.

When these polymers are used as a mixture with pigments, a visible coloration is generally obtained irrespective of the initial colour of the hair. This is achieved without prior bleaching of the hair. The presence of these pigments, especially of nacres, makes it possible to obtain a chromatic and visible coloration on all hair types. However, the coloration obtained is not always sufficiently visible and predictable. Moreover, with standard pigments, certain shades are very difficult to obtain, especially blonds.

Thus, the aim of the present invention is to develop coatings comprising a coloured species that makes it possible to obtain a wide range of intense and/or chromatic colorations, without the need for a bleaching step.

This aim is achieved with the present invention, one subject of which is a keratin fibre treatment composition comprising one or more copolymers based on
silicone resin and on fluid silicone, one or more volatile solvents, and one or more metal particles comprising more than 80% of metals.

A subject of the invention is also a process for colouring keratin fibres, for obtaining an intense and/or chromatic colour effect.

Another subject of the invention is the use of this composition for obtaining a coloured coating on keratin fibres.

These coatings make it possible to give the hair shampoo-remanent intense and/or chromatic colorations, while at the same time maintaining the physical qualities of the keratin fibre, since they afford permanent colorations without using oxidizing agents liable to degrade the hair.

Hereinafter, unless indicated otherwise, the limits of the ranges indicated are included in the invention.

**Copolymer based on silicone resin and on fluid silicone**

The silicone copolymer defined according to the invention is derived from the reaction between a silicone resin and a fluid silicone.

Such copolymers are described, for example, in "Silicone Pressure Sensitive Adhesive", Sobieski and Tangney, Handbook of Pressure Sensitive Adhesive Technology (D. Satas Ed.), Von Nostrand Reinhold, New York.

In the copolymer, the silicone resin is present in a content of between 45% and 75% (relative to the total mass of silicone) and the fluid silicone is present in a content of between 25% and 55%, the sum of the percentages of silicone resin and of fluid silicone
being equal to 100. Preferably, the silicone resin is present in a content of between 55% and 65% (relative to the total mass of silicone) and the fluid silicone is present in a content of between 35% and 45%, the sum of the percentages of silicone resin and of fluid silicone being equal to 100.

Preferably, the silicone resin according to the invention is the product of condensation of groups Siθ₂ and of groups Rs(SiO)₁/₂ (triorganosilyl) for which each group R is independently selected from methyl, ethyl, propyl and vinyl radicals and for which the ratio between the Siθ₂ functions and the Rs(SiO)₁/₂ functions of the silicone resin ranges from 0.6 to 0.9.

Triorganosilyl groups that may be used to form the silicone resin may be trimethylsilyl, triethylsilyl, methylmethylpropylsilyl or dimethylvinylsilyl groups, and mixtures thereof. The trimethylsilyl group is preferred in the context of the invention.

Preferably, the fluid silicone according to the invention is a diorganopolysiloxane bearing OH end functions, having a viscosity of between 100 and 100 000 cSt at 25°C, for which the substituents of the diorganopolysiloxane are independently chosen from methyl, ethyl, propyl and vinyl radicals. The diorganopolysiloxanes are preferably linear polymers. Examples of diorganopolysiloxanes may be, in a non-limiting manner, a polydimethylsiloxane, an ethylmethyl polysiloxane, a copolymer of dimethylsiloxane and of methylvinylsiloxane, and mixtures of such polymers or copolymers containing OH end groups. The preferred diorganopolysiloxane is a polydimethylsiloxane.

Examples of synthesis of such a copolymer are described, for example, in patent US 5 162 410 or in patent CA 711 756.

The copolymers according to the present invention may
thus be prepared by heating the following mixture:
- from 45% to 75% by mass of silicone resin, being the product of condensation of Si\(_2\) and \(Rs(SiO)_{1/2}\) units for which each group \(R\) is independently selected from methyl, ethyl, propyl and vinyl radicals and for which the ratio between the Si\(_2\) functions and the \(Rs(SiO)_{1/2}\) functions of the silicone resin ranges from 0.6 to 0.9;
- from 25% to 55% by mass of fluid diorganopolysiloxane containing OH end functions, with a viscosity of between 100 and 100 000 cSt at 25°C, for which the substituents of the diorganopolysiloxane are independently chosen from methyl, ethyl, propyl and vinyl radicals;
- from 0.001% to 5% of a suitable catalyst, which is preferably an organic aliphatic amine compound preferably chosen from primary amines, secondary amines, tertiary amines, carboxylic acid salts of the amines mentioned above and quaternary ammonium salts.

The mixture is heated to a temperature of between 80°C and 160°C until the adhesive nature of the resulting silicone copolymer is obtained.

The copolymers that are preferred according to the invention are sold by Dow Corning under the reference Bio-PSA®, these Bio-PSA® copolymers possibly being in two forms, standard or amine-compatible, and being provided in different solvents with several silicone resin/fluid silicone ratios. Mention may be made especially of the grades 7-4400, 7-4500 and 7-4600. The Bio-PSA® that is particularly preferred according to the invention is the grade 7-4400.

According to a particular embodiment of the invention, the quantity of copolymer is greater than 1% by weight of the total weight of the composition.
The copolymer may in particular be present in the composition according to the invention in a content of greater than 1% and up to 40% by weight, preferably ranging from 1.5% to 20% by weight and preferentially ranging from 1.5% to 15% by weight, relative to the total weight of the composition.

Volatile solvent

According to the invention, the composition applied to the hair contains one or more volatile solvents.

In the context of the invention, the term "volatile solvent" means a compound that is liquid at room temperature (20°C) and at atmospheric pressure (760 mmHg), with a vapour pressure at 20°C of greater than 0.1 mmHg, preferably between 0.1 and 300 mmHg and even more preferentially between 0.5 and 200 mmHg.

This volatile solvent may be water, a non-silicone organic solvent, a silicon organic solvent or mixtures thereof.

Volatile non-silicone organic solvents that may be mentioned include:
- volatile C1-C4 alkanols such as ethanol or isopropanol;
- volatile C5-C7 alkanes such as n-pentane, hexane, cyclopentane, 2,3-dimethylbutane, 2,2-dimethylbutane, 2-methylpentane or 3-methylpentane;
- esters of liquid Cl-C20 acids and of volatile Cl-Cs alcohols such as methyl acetate, n-butyl acetate, ethyl acetate, propyl acetate, isopentyl acetate or ethyl 3-ethoxypropionate;
- ketones that are liquid at room temperature and volatile, such as methyl ethyl ketone, methyl isobutyl ketone, diisobutyl ketone, isophorone, cyclohexanone or acetone;
- volatile polyols such as propylene glycol;
volatile ethers such as dimethoxymethane, diethoxyethane or diethyl ether;
volatile glycol ethers such as 2-butoxyethanol, butyl diglycol, diethylene glycol monomethyl ether, propylene glycol n-butyl ether or propylene glycol monomethyl ether acetate;
volatile hydrocarbon-based oils such as volatile hydrocarbon-based oils containing from 8 to 16 carbon atoms, and mixtures thereof, and especially branched Cs-Ci6 alkanes, for instance Cs-Ci6 isooalkanes (also known as isoparaffins), isododecane, isodecane and, for example, the oils sold under the trade names Isopar or Permethyl, and mixtures thereof. Mention may also be made of isohexyl or isodecyl neopentanoate;
volatile C4-C10 perfluoroalkanes such as dodecafluoropentane, tetradecafluoroheptane or decafluoropentane;
volatile perfluorocycloalkyls such as perfluoromethylcyclopentane, 1,3-perfluoro-dimethylcyclohexane and perfluorodecalin, sold, respectively, under the names Flutec PCI®, Flutec PC3® and Flutec PC6® by the company F2 Chemicals, and also perfluorodimethylcyclobutane and perfluoromorpholine;
the volatile fluoroalkyl or heterofluoroalkyl compounds corresponding to the following formula:

$$\text{CH}_3-(	ext{CH}_2)_n[Z]_t-X\text{-CF}_3$$

in which $t$ is 0 or 1; $n$ is 0, 1, 2 or 3; $X$ is a linear or branched divalent perfluoroalkyl radical containing from 2 to 5 carbon atoms, and $Z$ represents $O$, $S$ or $NR$, $R$ being a hydrogen atom or a radical $-(\text{CH}_2)_n-\text{CH}_3$ or a radical $-(\text{CF}_2)_m-\text{CF}_3$, $m$ being 2, 3, 4 or 5.

Among the volatile fluoroalkyl or heterofluoroalkyl compounds that may especially be mentioned are
methoxynonafluorobutane sold under the name MSX 4518® and HFE-7100® by the company 3M, and ethoxynonafluorobutane sold under the name HFE-7200® by the company 3M.

Preferably, the solvent is chosen such that its boiling point is less than 200°C.

According to a particular embodiment, the non-silicone organic solvent is chosen from ethanol, isopropanol, acetone, and alkanes which are liquid at 25°C and at atmospheric pressure (760 mmHg) such as isododecane.

Volatile silicone compounds that may be mentioned include low-viscosity silicon compounds chosen from linear or cyclic silicones containing from 2 to 7 silicon atoms, these silicones optionally comprising alkyl or alkoxy groups containing from 1 to 10 carbon atoms, for example octamethylcyclotetrasiloxane, decamethylcyclopentasiloxane, dodecamethylcyclohexasiloxane, heptamethylhexyltrisiloxane, heptamethylenehexyltrisiloxane, octamethylenehexyltrisiloxane and decamethyltetrasiloxane, and mixtures thereof. According to one particular embodiment, the silicone compound is chosen from cyclopentadimethylsiloxane and dodecamethylcyclohexasiloxane.

This volatile silicone generally has a low viscosity, for example a viscosity of less than 10 cSt at 25°C.

Preferably, the volatile silicone is chosen from decamethylcyclopentasiloxane, dodecamethylcyclohexasiloxane, octamethylenehexyltrisiloxane and decamethyltetrasiloxane.

Examples that may be mentioned include the decamethylcyclopentasiloxane sold under the name DC-245 by the company Dow Corning, dodecamethylcyclohexasiloxane sold under the name DC-246 by the company Dow Corning the octamethylenehexyltrisiloxane sold under the
name DC-200 Fluid 1 cSt by the company Dow Corning, and the decamethyltetrasiloxane sold under the name DC-200 Fluid 1.5 cSt by the company Dow Corning.

According to a particular embodiment of the invention, the volatile solvent(s) is (are) chosen from water, ethanol, isopropanol, acetone, isododecane, decamethylcyclopentasiloxane, dodecamethylcyclohexasiloxane, octamethyltrisiloxane and decamethyltetrasiloxane and mixtures thereof.

The volatile solvent may be present in the composition which can be used in the process of the invention in a content ranging from 0.1% to 95% by weight, preferably ranging from 1% to 90% by weight and preferentially ranging from 5% to 90% by weight, relative to the total weight of the composition.

**Metal particles**

The metal particle is formed from a pure metal or a metal alloy.

The metal particle that is useful in the composition of the invention is advantageously in the form of "platelets". The term "platelets" denotes particles in which the ratio of the largest dimension to the smallest dimension, known as the shape factor, is greater than or equal to 5.

The term "dimensions" denotes the dimensions given by the statistical particle size distribution to half the population, known as the D50. The metal particle in particular has a shape factor of greater than or equal to 8 and especially 10, for example greater than or equal to 15.

For the purposes of the invention, the metal particles are formed to more than 80% of one or more metals.
The metal particle may be chosen from silver, aluminium, iron, chromium, nickel, molybdenum, gold, copper, zinc, tin, magnesium, steel, bronze, titanium and alloys of these metals. Preferably, the metal particle is chosen from copper, zinc, aluminium, titanium, silver, gold and alloys of these metals. A metal particle chosen from aluminium (advantageously having an aluminium content of greater than or equal to 99%), copper (advantageously having a copper content of greater than or equal to 95%), bronze (preferably having a copper content ranging from 70% to 95% and a zinc content ranging from 5% to 30%) is more preferentially used.

The metal particle of the invention may also be coated with the lubricant used during its production, especially oleic acid or stearic acid.

The metal core of the particle of the invention may also be coated with at least one "coating" layer of at least one inorganic or organic material. The inorganic material is preferably chosen from metal oxides such as titanium oxide, aluminium oxide, iron oxide, cerium oxide, chromium oxide and silicon oxides, and mixtures thereof. The organic material is preferably chosen from polyacrylates, silicones, polyolefins, polystyrene, polyesters, cellulose esters, polyamides, organophosphorus substances and mixtures thereof. When the metal particle is coated also with the lubricant or other than with the lubricant used during its production, it is preferably coated with at least one layer of silicon oxide SiO₂. These metal particles coated with SiO₂ and the process for preparing them are described, for example, in document DE 10238090.

The weight ratio of the coating layer relative to the metal substrate may range from 0.2 to 0.001. The coating layer may have a thickness ranging from 5 to 500 nm and in particular ranging from 100 to 200 nm.
The metal substrate coated with the layer of inorganic material may have a mean size (D50) ranging from 1 µm to 100 µm and preferably ranging from 1 to 25 µm.

The metal particles used in the compositions according to the invention have, for example, according to their largest dimension, a mean size of less than or equal to 25 µm and in particular less than or equal to 15 µm.

The "mean size" denotes the dimension given by the statistical particle size distribution to half the population, known as the D50.

The said particles generally have a thickness of less than or equal to 1 µm, especially less than or equal to 0.7 µm and in particular less than or equal to 0.5 µm.

As metal particles that may be used in the composition according to the invention, mention may be made of aluminium particles, such as those sold under the names Starbrite 2100 EAC® by the company Siberline and Metalure® by the company Eckart. Mention may also be made of bronze powders such as those sold under the names Premior Super 8000 by the company Wolstenholme and under the names Rothoflex, Lithoflex and Standard by the company Eckart with, for example, the references Standart Bronze Powder Offset 3000 Super Pale Gold (D50 3-5 µm) and Lithoflex XA 40-03 Rich Pale Gold (D50 3-5 µm). Mention may also be made of metal alloy particles, for instance bronze powders coated with silica sold under the name Visionaire Honey (D50 17 µm) and under the name Visionaire Amber (D50 17 µm) by the company Eckart, and also those sold under the name Dorolan 08/0 Pale Gold (D50 7-9 µm), aluminium powder coated with SiO2 sold under the reference Visionaire Silver Sea (D50 17 µm) and copper powders coated with SiO2 sold under the reference Visionaire Cinnamon (D50 17 µm) and under the reference Visionaire Lava (D50 17 µm) by the company Eckart, and also those sold under
the name Dorolan 10/0 Copper (D50 9-11 µm).

The amount of metal particles is between 0.1% and 40% by weight and preferably from 0.5% to 20% by weight relative to the total weight of the composition.

**Additional additives**

The composition of the invention may comprise other cosmetic additives. The composition may especially comprise additional silicone compounds other than volatile silicones.

According to one particular embodiment, the composition of the invention may contain one or more polysiloxanes with a viscosity of greater than 100 cSt and preferably greater than 300 cSt. The viscosity of these polysiloxanes may be measured according to standard ASTM D-445. Such polysiloxanes may be silicone oils, gums or resins, and crosslinked silicones.

Polysiloxanes with a viscosity of greater than 100 cSt that may be mentioned are polydimethylsiloxanes; alkyl dimethicones; polyphenylmethylsiloxanes such as phenyl dimethicones, phenyl trimethicones and vinyl methyl methicones; and also silicones modified with optionally fluorinated aliphatic and/or aromatic groups, or with functional groups such as hydroxyl, thiol and/or amine groups.

Such polysiloxanes may be chosen from the silicones of formula (I):

![Chemical structure](image)

where:

- $X$: A hydrocarbon group.
- $R_1$, $R_2$: Alkyl groups.
- $R_3$, $R_4$, $R_5$, $R_6$: Functional groups such as hydroxyl, thiol, and/or amine.
- $n$, $p$: Integers representing the number of silicones in the chain.
Ri, R2, R5 and Re are, together or separately, an alkyl radical containing 1 to 6 carbon atoms, R3 and R4 are, together or separately, an alkyl radical containing from 1 to 6 carbon atoms, a vinyl radical, an aryl radical, an optionally substituted aminoalkyl radical containing from 1 to 6 carbon atoms, a hydroxyl radical, a thioalkyl radical containing from 1 to 6 carbon atoms, X is an alkyl radical containing from 1 to 6 carbon atoms, a hydroxyl radical, a vinyl radical, an optionally substituted aminoalkyl radical containing from 1 to 6 carbon atoms, a thioalkyl radical containing from 1 to 6 carbon atoms, n and p being integers chosen so as to obtain a viscosity greater than 300 cSt.

Examples that may be mentioned include the following polydimethylsiloxanes:

- the substituents Ri to Re and X represent a methyl group, such as the product sold under the name Baysilicone TP 3898 by the company General Electric, and the product sold under the name AK 500 000 by the company Wacker,

- the substituents Ri to Re and X represent a methyl group, and p and n are such that the molecular weight is 120 000 g/mol, such as the product sold under the name Dow Corning 200 Fluid 60 000 CS by the company Dow Corning,

- the substituents Ri to Re and X represent a methyl group, and p and n are such that the molecular weight is 250 000 g/mol, for instance the product sold under the name Mirasil DM 500 000 by the company Rhodia and the product sold under the name Dow Corning 200 Fluid 500 000 cSt by the company Dow Corning,

- the substituents Ri to Re and X represent a methyl group, the group X represents a hydroxyl group, and n and p are such that the molecular weight of the polymer is 600 000 g/mol, for instance the product sold under the name SGM 36 by the company
Dow Corning,

- dimethicones of the (polydimethylsiloxane) (methyl-vinylsiloxane) type, such as SE63 sold by GE Bayer Silicones, and poly (dimethylsiloxane) (diphenyl) (methylvinylsiloxane) copolymers, and mixtures thereof.

When the polysiloxane comprises a fluorinated group, copolymers may be chosen having the following structure:

\[
R_1 \bigg( \begin{array}{c}
R_1 \\
\vdots \\
R_1
\end{array} \bigg) \bigg( \begin{array}{c}
R_1 \\
\vdots \\
R_1
\end{array} \bigg) \bigg( \begin{array}{c}
\text{CH}_a \\
\vdots \\
\text{RF}
\end{array} \bigg) \bigg( \begin{array}{c}
R_1 \\
\vdots \\
R_1
\end{array} \bigg)
\]

in which:

- \( R \) represents a linear or branched divalent alkyl group containing 1 to 6 carbon atoms, preferably a divalent methyl, ethyl, propyl or butyl group,
- \( Rf \) represents a fluoroalkyl radical, especially a perfluoroalkyl radical, containing 1 to 12 carbon atoms and preferably 1 to 9 carbon atoms,
- \( R_i \) represents, independently of each other, a C1-C20 alkyl radical, a hydroxyl radical or a phenyl radical, and \( R_2 \) represents \( R_i \) or \( R_f \),
- \( m \) is chosen from 0 to 500, preferably from 0 to 200,
- and \( n \) is chosen from 1 to 1000 and preferably from 1 to 500.

Preferably, the groups \( R_i \) are identical and represent a methyl radical.

Such polysiloxanes are especially those sold by the company Shin-Etsu under the names FL-5, FL-IO, X22-821 and X22-822 or FL-100, by the company Dow Corning under the name FS-1265 Fluid, by the company Phoenix Chemical under the name Pecosil FS, or under the names Pecosil FSL-150, Pecosil FSL-300, Pecosil FSH-150, Pecosil
FSH-300, Pecosil FSU-150 and Pecosil FSU-300.

The weight-average molecular mass of the polysiloxane(s) may be between 1000 and 1 500 000 g/mol and especially between 20 000 and 1 000 000 g/mol.

The polysiloxane may be a resin. The term "resin" means a crosslinked or non-crosslinked three-dimensional structure. Examples of polysiloxane resins that may be mentioned include silsesquioxanes and siloxysilicates.

The nomenclature of silicone resins is known under the name MDTQ, the resin being described as a function of the various siloxane monomer units it comprises, each of the letters MDTQ characterizing a type of unit.

The letter M represents the monofunctional unit of formula \((\text{CH}_3)_3\text{SiO}_{1/2}\). the silicon atom being connected to only one oxygen atom in the polymer comprising this unit.

The letter D means a difunctional unit \((\text{CH}_3)_2\text{SiO}_{2/2}\) in which the silicon atom is connected to two oxygen atoms.

The letter T represents a trifunctional unit of formula \((\text{CH}_3)\text{SiO}_{3/2}\).

In the units M, D and T defined previously, at least one of the methyl groups may be substituted with a group R other than a methyl group, such as a hydrocarbon-based radical (especially alkyl) containing from 2 to 10 carbon atoms or a phenyl group, or alternatively a hydroxyl group.

Finally, the letter Q means a tetrafunctional unit \(\text{SiO}_{4/2}\) in which the silicon atom is bonded to four hydrogen atoms, which are themselves bonded to the rest of the polymer.
Various resins with different properties may be obtained from these different units, the properties of these polymers varying as a function of the type of monomers (or units), of the type and number of substituted radicals, of the length of the polymer chain, of the degree of branching and of the size of the side chains.

As examples of these silicone resins, mention may be made of:
- siloxysilicates which may be trimethylsiloxysilicate of formula \([(CH_3)SiO]\_x(SiO\_2/2)\_y (units MQ)\) in which \(x\) and \(y\) are integers ranging from 50 to 80,
- polysilsesquioxanes of formula \((CH_3SiO\_3/2)\_x\) (units \(T\)) in which at least one of the methyl radicals may be substituted with a group \(R\) as defined above. Preferably, the number \(x\) of units \(T\) of the silsesquioxane is less than or equal to 500. It is more preferentially between 50 and 500. The molecular weight of the silicone resin according to the invention is thus preferably between 500 and 50,000 g/mol, more preferentially between 500 and 20,000 g/mol and even more preferentially between 500 and 10,000 g/mol;
- polymethylsilsesquioxanes, which are polysilsesquioxanes in which none of the methyl radicals is substituted with another group. Such polymethylsilsesquioxanes are described in document US 5,246,694, the content of which is incorporated by reference;
- polypropylsilsesquioxanes, for which the methyl radicals are replaced with propyl radicals. These compounds and their synthesis are especially described in patent application WO 2005/075,567;
- polyphenylsilsesquioxanes, for which the methyl radicals are replaced with phenyl radicals. These compounds and their synthesis are especially described in patent application US 2004/0180,011.

Examples of commercially available polymethylsilsesquioxane resins that may be mentioned include those sold:
by the company Wacker under the reference Resin MK such as Belsil PMS MK: polymer comprising $\text{CH}_3\text{SiO}_3\text{H}$ repeating units (units $\tau$), which may also comprise up to 1% by weight of $(\text{CH}_3)_2\text{SiO}_2\text{H}$ units (units $\delta$) and having an average molecular weight of about 10 000 g/mol. It is thought that the polymer is in a "cage" and "ladder" configuration as represented in the figures below. The average molecular weight of the units in "cage" configuration has been calculated as 536 g/mol. The majority of the polymer is in the "ladder" configuration with ethoxy groups at the ends. These ethoxy groups represent 4.5% by mass of the polymer. As these end groups can react with water, a small and variable amount of SiOH groups may also be present.

Examples of commercially available polypropylsilsesquioxane resins that may be mentioned include those sold:
- by the company Shin-Etsu under the references KR-220L, which are composed of units $\tau$ of formula $\text{CH}_3\text{SiO}_3\text{H}$ and have Si-OH (silanol) end groups, under the reference KR-242A, which comprise 98% of units $\tau$ and 2% of dimethyl units $\delta$ and have Si-OH end groups or alternatively under the reference KR-251 comprising 88% of units $\tau$ and 12% of dimethyl units $\delta$ and have Si-OH end groups.

- by the company Dow Corning under the reference Dow Corning 670 Fluid, which is a polypropylsilsesquioxane diluted in D5.
Examples of commercially available polyphenylsilsesquioxane resins that may be mentioned include those sold:
- by the company Dow Corning under the reference Dow Corning 217 Flake Resin, which is a polyphenylsilsesquioxane with silanol end groups;
- by the company Wacker under the reference Belsil SPR 45 VP.

Siloxysilicate resins that may be mentioned include trimethylsiloxysilicate (TMS) resins optionally in the form of powders. Such resins are sold under the reference SR1000 by the company General Electric or under the reference TMS 803 by the company Wacker. Mention may also be made of the trimethylsiloxysilicate resins sold in a solvent such as cyclomethicone, sold under the name KF-7312J by the company Shin-Etsu or DC 749 or DC 593 by the company Dow Corning.

The silicone resin according to the invention is preferably film-forming. Specifically, not all silsesquioxanes are film-forming: for example, highly polymerized polymethylsilsesquioxanes such as Tospearl™ from Toshiba or KMP590 from Shin-Etsu are insoluble and are not film-forming.

In one embodiment of the invention, the silicone resin (s) that is (are) useful in the composition of the invention is (are) soluble or dispersible in the composition of the invention. Preferably, the silicone resins according to the invention are soluble in volatile silicones and organic solvents. In one embodiment, the silicone resin is solid at 25°C.

The silicone resins that are preferred according to the invention are trimethylsiloxysilicate resins, polymethylsilsesquioxane resins and polypropylsilsesquioxane resins.

The composition of the invention may also contain a
crosslinked silicone such as a crosslinked elastomeric organopolysiloxane, a silicone compound of high molecular weight having a three-dimensional structure, with the viscoelastic properties of a supple solid material. These organopolysiloxanes may thus be in dry, powder form, or in swollen form, in a solvent, the resulting product generally being a gel. These products may also be in dispersed form in an aqueous solution.

The synthesis of these organopolysiloxanes is described in the following patents:
- US 5 266 321 by Kobayashi Rose,
- US 4 742 142 by Toray Silicone,
- US 5 654 362 by Dow Corning Corp.,
- patent application FR 2 864 784.

The elastomeric organopolysiloxanes used in the composition may be partially or totally crosslinked. They are generally in the form of particles. In particular, the elastomeric organopolysiloxane particles have a number-average size ranging from 0.1 to 500 µm. These particles may have any shape and, for example, may be spherical, flat or amorphous.

The crosslinked organopolysiloxane obtained may be a non-emulsifying compound or an emulsifying compound. The term "non-emulsifying" defines crosslinked organopolysiloxanes not containing any polyoxyalkylene units. The term "emulsifying" means crosslinked organopolysiloxane compounds containing at least one polyoxyalkylene unit, especially a polyoxyethylene or polyoxypropylene unit.

The crosslinked organopolysiloxane particles may be conveyed in the form of a gel formed from a crosslinked organopolysiloxane included in at least one hydrocarbon-based oil and/or one silicone oil. In these gels, the organopolysiloxane particles are often non-spherical particles. The crosslinked organopolysiloxane
particles may also be in powder form, especially in the form of a spherical powder.


As non-emulsifying crosslinked organopolysiloxanes, use may be made of those sold under the names KSG-6, KSG-15, KSG-16, KSG-18, KSG-31, KSG-32, KSG-33, KSG-41, KSG-42, KSG-43, KSG-44 and USG-103 by the company Shin-Etsu, DC 9040, DC9041, DC 9509, DC9505, DC 9506 and DC 9045 by the company Dow Corning, Gransil by the company Grant Industries and SFE 839 by the company General Electric.

Advantageously, the emulsifying crosslinked organopolysiloxanes comprise polyoxyalkylene-modified organopolysiloxanes formed from divinyl compounds, in particular polysiloxanes containing at least two vinyl groups, reacting with Si-H bonds of a polysiloxane. Emulsifying crosslinked organopolysiloxanes are especially described in patents US 5 236 986, US 5 412 004, US 5 837 793 and US 5 811 487.

Emulsifying crosslinked organopolysiloxanes that may be used include those sold under the names KSG-21, KSG-20 and KSG-30 by the company Shin-Etsu, and DC9010 and DC9011 by the company Dow Corning.

The elastomeric crosslinked organopolysiloxane particles may also be in the form of an elastomeric crosslinked organopolysiloxane powder coated with silicone resin, especially with silsesquioxane resin, as described, for example, in patent US 5 538 793.

Such elastomers are sold under the names KSP-100, KSP-101, KSP-102, KSP-103, KSP-104 and KSP-105 by the
company Shin-Etsu.

Preferably, the crosslinked organopolysiloxane is non-emulsifying.

The composition of the invention may also contain a grafted silicone polymer. In the context of the invention, the term "grafted silicone polymer" means a polymer comprising a polysiloxane portion and a portion formed from a non-silicone organic chain, one of the two portions constituting the main chain of the polymer, the other being grafted onto the said main chain.

The grafted silicone polymers used in the cosmetic composition according to the invention are preferentially chosen from the group formed by polymers containing a non-silicone organic backbone grafted with monomers containing a polysiloxane, and polymers containing a polysiloxane backbone grafted with non-silicone organic monomers, and mixtures thereof.

The non-silicone organic monomers constituting the main chain of the grafted silicone polymer may be chosen from radical-polymerizable ethylenically unsaturated monomers, polycondensation-polymerizable monomers such as those forming polyamides, polyesters or polyurethanes, and ring-opening monomers such as those of oxazoline or caprolactone type.

The polymers with a non-silicone organic backbone grafted with monomers containing a polysiloxane, in accordance with the invention, may be chosen from those described in patents US 4 693 935, US 4 728 571 and US 4 972 037 and patent applications EP-A-O 412 704, EP-A-O 412 707, EP-A-O 640 105 and WO 95/00578. These are copolymers obtained by radical polymerization from ethylenically unsaturated monomers and silicone macromers containing a vinyl end group, or copolymers...
obtained by reacting a polyolefin comprising functionalized groups and a polysiloxane macromer containing an end function that is reactive with the said functionalized groups.

The copolymer containing a non-silicone organic backbone grafted with monomers containing a polysiloxane may, for example, have the following structure:

Such a polymer is sold under the name KP 561 by the company Shin-Etsu.

The copolymer containing a non-silicone organic backbone grafted with monomers containing a polysiloxane may also have the following structure:

Such a polymer, Polysilicone 7, is sold under the name SA70 by 3M.

Other copolymers containing a non-silicone organic backbone grafted with monomers containing a
polysiloxane may also be KP545, KP574 and KP575 sold by Shin-Etsu.

A grafted silicone compound that may also be mentioned is the isobutyl methacrylate/bis-hydroxypropyl dimethicone acrylate copolymer sold by Grant Industries under the name Granacrysil BMAS.

According to the present invention, the grafted silicone polymer(s), containing a polysiloxane backbone grafted with non-silicone organic monomers comprise(s) a silicone main chain (or polysiloxane (=Si-O-)ₙ) on which is grafted, within the said chain and also optionally on at least one of its ends, at least one organic group not comprising silicone.

Examples of silicone polymers corresponding to the definition are especially polydimethylsiloxanes (PDMS) onto which are grafted, via a connecting chain unit of thiopropylene type, mixed polymer units of poly (meth) acrylic acid type and of polyalkyl (meth) acrylate type. As a compound corresponding to this definition, mention may be made of polydimethyl/methylsiloxane containing methyl 3-thiopropylacrylate groups/ methyl methacrylate/methacrylic acid or Polysilicone-8 sold under the name VS80 by the company 3M.

Other examples of silicone polymers are especially polydimethylsiloxanes (PDMS) onto which are grafted, via a connecting chain unit of thiopropylene type, polymer units of the polyisobutyl (meth) acrylate type.

Preferably, the number-average molecular mass of the silicone polymers containing a polysiloxane backbone grafted with non-silicone organic monomers of the invention ranges from 10 000 to 1 000 000 approximately and even more preferentially from 10 000 to 100 000 approximately.
Preferably, the grafted silicone polymers are chosen from the group formed by the copolymer of alkyl methacrylate grafted with polydimethylsiloxane, copolymers of isobutyl methacrylate, acrylic acid and silicone macromer and the polydimethyl/methyl siloxane containing methyl 3-thiopropylacrylate groups/methyl methacrylate/methacrylic acid.

The preferred silicone compounds are silicone oils, especially those described in formula (I), and silicone resins.

When they are present in the composition in accordance with the invention, the amount of additional silicone compounds is between 0.1% and 30% by weight, preferably between 0.1% and 20% by weight and even more preferentially between 0.1% and 10% by weight relative to the total weight of the composition.

The composition of the invention may also contain one or more pigments other than metal particles.

The term "pigments" means any pigment that gives colour to keratin materials. Their solubility in water at 25°C and at atmospheric pressure (760 mmHg) is less than 0.05% and preferably less than 0.01%.

The pigments that may be used are especially chosen from the organic and/or mineral pigments known in the art, especially those described in Kirk-Othmer's Encyclopaedia of Chemical Technology and in Ullmann's Encyclopaedia of Industrial Chemistry.

These pigments may be in the form of pigmentary powder or paste. They may be coated or uncoated.

The pigments may be chosen, for example, from mineral pigments, organic pigments, lakes, pigments with
special effects such as nacres, metal pigments or glitter flakes, and mixtures thereof.

The pigment may be a natural pigment. The term "natural pigment" means any pigment that satisfies the definition in Ullmann's encyclopaedia in the chapter on inorganic pigments. Among the mineral pigments that are useful in the present invention, mention may be made of iron oxides, chromium oxides, manganese violet, ultramarine blue, chromium hydrate and ferric blue, titanium oxide.

The pigment may be an organic pigment. The term "organic pigment" means any pigment that satisfies the definition in Ullmann's encyclopaedia in the chapter on organic pigments. The organic pigment may be chosen especially from nitroso, nitro, azo, xanthene, quinoline, anthraquinone, phthalocyanin, isoindolinone, isoindoline, quinacridone, perinone, perylene, diketopyrrolopyrrole, thioindigo, dioxazine, triphenylmethane and quinophthalone compounds.

In particular, the organic pigments may be chosen from carmine, carbon black, aniline black, melanin, azo yellow, quinacridone, phthalocyanin blue, sorghum red, the blue pigments codified in the Color Index under the references CI 42090, 69800, 69825, 73000, 74100 and 74160, the yellow pigments codified in the Color Index under the references CI 11680, 11710, 15985, 19140, 20040, 21100, 21108, 47000 and 47005, the green pigments codified in the Color Index under the references CI 61565, 61570 and 74260, the orange pigments codified in the Color Index under the references CI 11725, 15510, 45370 and 71105, the red pigments codified in the Color Index under the references CI 12085, 12120, 12370, 12420, 12490, 14700, 15525, 15580, 15620, 15630, 15800, 15850, 15865, 15880, 17200, 26100, 45380, 45410, 58000, 73360, 73915 and 75470, and the pigments obtained by oxidative
polymerization of indole or phenolic derivatives as described in patent FR 2 679 771.

The pigments in accordance with the invention may also be in the form of composite pigments as described in patent EP 1 184 426. These composite pigments may be compounds especially of particles comprising a mineral core, at least one binder for ensuring the binding of the organic pigments to the core, and at least one organic pigment at least partially covering the core.

The organic pigment may also be a lake. The term "lake" means insolubilized dyes adsorbed onto insoluble particles, the assembly thus obtained remaining insoluble during use.

The inorganic substrates onto which the dyes are adsorbed are, for example, alumina, silica, calcium sodium borosilicate or calcium aluminium borosilicate, and aluminium.

Among the dyes, mention may be made of cochineal carmine. Mention may also be made of the products known under the following names: D&C Red 21 (CI 45 380), D&C Orange 5 (CI 45 370), D&C Red 27 (CI 45 410), D&C Orange 10 (CI 45 425), D&C Red 3 (CI 45 430), D&C Red 4 (CI 15 510), D&C Red 33 (CI 17 200), D&C Yellow 5 (CI 19 140), D&C Yellow 6 (CI 15 985), D&C Green (CI 61 570), D&C Yellow 1 O (CI 77 002), D&C Green 3 (CI 42 053), D&C Blue 1 (CI 42 090).

An example of a lake that may be mentioned is the product known under the following name: D&C Red 7 (CI 15 850:1).

The pigment may also be a pigment with special effects. The term "pigments with special effects" means pigments that generally create a non-uniform coloured appearance (characterized by a certain shade, a certain vivacity
and a certain lightness) that changes as a function of the conditions of observation (light, temperature, observation angles, etc.)- They thus contrast with white or coloured pigments that afford a standard uniform opaque, semi-transparent or transparent shade.

Several types of pigment with special effects exist: those with a low refractive index, such as fluorescent, photochromic or thermochromic pigments, and those with a high refractive index, such as nacres or glitter flakes.

Examples of pigments with special effects that may be mentioned include nacreous pigments such as mica coated with titanium oxide or with bismuth oxychloride, coloured nacreous pigments such as mica coated with titanium oxide and with iron oxides, mica coated with iron oxide, mica coated with titanium oxide and especially with ferric blue or with chromium oxide, mica coated with titanium oxide and with an organic pigment of the abovementioned type, and also nacreous pigments based on bismuth oxychloride. They may also be mica particles at the surface of which are superposed at least two successive layers of metal oxides and/or of organic dyestuffs.

The nacres may more particularly have a yellow, pink, red, bronze, orange, brown, gold and/or coppery colour or tint.

As illustrations of nacres that may be used in the context of the present invention, mention may be made especially of the gold-coloured nacres sold especially by the company Engelhard under the name Gold 222C (Cloisonne), Sparkle gold (Timica), Gold 4504 (Chromalite) and Monarch gold 233X (Cloisonne); the bronze nacres sold especially by the company Merck under the name Bronze fine (17384) (Colorona) and Bronze (17353) (Colorona), by the company Eckart under
the name Prestige Bronze and Prestige Soft Bronze and
by the company Engelhard under the name Super bronze
(Cloisonne); the orange nacres sold especially by the
company Engelhard under the name Orange 363C
(Cloisonne) and Orange MCR 101 (Cosmica) and by the
company Merck under the name Passion orange (Colorona)
and Matte orange (17449) (Microna); the brown nacres
sold especially by the company Engelhard under the name
Nu-antique copper 340XB (Cloisonne) and Brown CL4509
(Chromalite); the nacres with a copper tint sold
especially by the company Engelhard under the name
Copper 340A (Timica) and by the company Eckart under
the name Prestige Copper and Prestige Soft Copper; the
nacres with a red tint sold especially by the company
Merck under the name Sienna fine (17386) (Colorona);
the nacres with a yellow tint sold especially by the
company Engelhard under the name Yellow (4502)
(Chromalite); the red nacres with a gold tint sold
especially by the company Engelhard under the name
Sunstone G012 (Gemtone); the black nacres with a gold
tint sold especially by the company Engelhard under the name
Nu-antique bronze 240 AB (Timica), the blue nacres
sold especially by the company Merck under the name
Matte blue (17433) (Microna), Dark Blue (117324)
(Colorona), the white nacres with a silvery tint sold
esspecially by the company Merck under the name Xirona
Silver, and the golden-green pink-orange nacres sold
esspecially by the company Merck under the name Indian
summer (Xirona), and mixtures thereof.

In addition to nacres on a mica support, multilayer
pigments based on synthetic substrates such as alumina,
silica, sodium calcium borosilicate or calcium
aluminium borosilicate, and aluminium, may be
envisioned.

Mention may also be made of pigments with an
interference effect that are not fixed onto a
substrate, for instance liquid crystals (Helicones HC
from Wacker), holographic interference flakes (Geometric Pigments or Spectra f/x from Spectratek). Pigments with special effects also comprise fluorescent pigments, whether these are substances that are fluorescent in daylight or that produce an ultraviolet fluorescence, phosphorescent pigments, photochromic pigments, thermochromic pigments and quantum dots, sold, for example, by the company Quantum Dots Corporation.

The variety of pigments that may be used in the present invention makes it possible to obtain a wide range of colours, and also particular optical effects such as metallic effects or interference effects.

The size of the pigments used in the cosmetic composition according to the present invention is generally between 10 nm and 200 µm, preferably between 20 nm and 18 µm and more preferentially between 30 nm and 50 µm.

The pigments may be dispersed in the product by means of a dispersant.

The dispersant serves to protect the dispersed particles against agglomeration or flocculation. This dispersant may be a surfactant, an oligomer, a polymer or a mixture of several thereof, bearing one or more functionalities with strong affinity for the surface of the particles to be dispersed. In particular, they can physically or chemically attach to the surface of the pigments. These dispersants also contain at least one functional group that is compatible with or soluble in the continuous medium. In particular, 12-hydroxystearic acid esters and C_8 to C_20 fatty acid esters of polyols such as glycerol or diglycerol are used, such as poly (12-hydroxystearic acid) stearate with a molecular weight of about 750 g/mol, such as the product sold under the name Solsperse 21 000 by the company Avecia,
polyglyceryl-2 dipolyhydroxystearate (CTFA name) sold under the reference Dehymyls PGPH by the company Henkel, or polyhydroxystearic acid such as the product sold under the reference Arlacel P100 by the company Uniqema, and mixtures thereof.

As other dispersants that may be used in the compositions of the invention, mention may be made of quaternary ammonium derivatives of polycondensed fatty acids, for instance Solsperse 17 000 sold by the company Avebia, and polydimethylsiloxane/oxypropylene mixtures such as those sold by the company Dow Corning under the references DC2-5185 and DC2-5225 C.

The pigments used in the cosmetic composition according to the invention may be surface-treated with an organic agent.

Thus, the pigments that have been surface-treated beforehand, which are useful in the context of the invention, are pigments that have totally or partially undergone a surface treatment of chemical, electronic, electrochemical, mechanochemical or mechanical nature, with an organic agent such as those described especially in Cosmetics and Toiletries, February 1990, Vol. 105, pp. 53-64, before being dispersed in the composition in accordance with the invention. These organic agents may be chosen, for example, from amino acids; waxes, for example carnauba wax and beeswax; fatty acids, fatty alcohols and derivatives thereof, such as stearic acid, hydroxystearic acid, stearyl alcohol, hydroxystearyl alcohol and lauric acid and derivatives thereof; anionic surfactants; lecithins; sodium, potassium, magnesium, iron, titanium, zinc or aluminium salts of fatty acids, for example aluminium stearate or laurate; metal alkoxides; polysaccharides, for example chitosan, cellulose and derivatives thereof; polyethylene; (meth) acrylic polymers, for example polymethyl methacrylates; polymers and
copolymers containing acrylate units; proteins; alkanolamines; silicone compounds, for example silicones, polydimethylsiloxanes, alkoxy silanes, alkylsilanes and siloxysilicates; organofluorine compounds, for example perfluoroalkyl ethers; fluorosilicone compounds.

The surface-treated pigments that are useful in the cosmetic composition according to the invention may also have been treated with a mixture of these compounds and/or may have undergone several surface treatments.

The surface-treated pigments that are useful in the context of the present invention may be prepared according to surface-treatment techniques that are well known to those skilled in the art, or may be commercially available in the required form.

Preferably, the surface-treated pigments are coated with an organic layer.

The organic agent with which the pigments are treated may be deposited on the pigments by evaporation of solvent, chemical reaction between the molecules of the surface agent or creation of a covalent bond between the surface agent and the pigments.

The surface treatment may thus be performed, for example, by chemical reaction of a surface agent with the surface of the pigments and creation of a covalent bond between the surface agent and the pigments or the fillers. This method is especially described in patent US 4 578 266.

An organic agent covalently bonded to the pigments will preferably be used.

The agent for the surface treatment may represent from
0.1% to 50% by weight, preferably from 0.5% to 30% by weight and even more preferentially from 1% to 10% by weight relative to the total weight of the surface-treated pigments.

When they are present, the amount of pigments is generally between 0.1% to 40% by weight, preferably 0.5% to 20% by weight of the total weight of the composition.

The composition according to the invention may comprise one or more thickeners chosen from polymeric thickeners and mineral thickeners, and mixtures thereof.

The thickener may be mineral or organic, and polymeric or non-polymeric. The thickener may be chosen to thicken an aqueous phase or a fatty phase of the composition, depending on the case.

The term "thickener" means a compound that modifies the rheology of the medium into which it is incorporated by increasing by at least 100 cPs the viscosity of the medium at 25°C and at a shear rate of 1 s⁻¹. This viscosity may be measured using a cone/plate viscometer (Haake R600 rheometer or the like).

The aqueous-medium thickener may be chosen from:
- hydrophilic clays,
- hydrophilic fumed silica,
- water-soluble cellulose-based thickeners, such as hydroxyethylcellulose, methylcellulose or hydroxypropylcellulose. Among these, mention may be made especially of the gums sold under the name Cellosize QP 4400 H by the company Amerchol,
- nonionic guar gums comprising C1-C6 hydroxyalkyl groups. Examples that may be mentioned include hydroxymethyl, hydroxypropyl and hydroxybutyl groups. Such guar gums are especially sold under the trade names Jaguar HP8, Jaguar HP60, Jaguar HP120 and Jaguar...
HP105 by the company Meyhall, or under the name Galactasol 40H4FD2 by the company Aqualon,
- carrageenans,
- locust bean gum, scleroglucan gum, gellan gum,
rhamsan gum or karaya gum,
- alginates, maltodextrins, starch and derivatives thereof, and hyaluronic acid and salts thereof,
- the polyglyceryl (meth)acrylate polymers sold under the names Hispagel and Lubragel by the companies
Hispano Quimica or Guardian,
- polyvinyl alcohol,
- crosslinked acrylamide polymers and copolymers, such as those sold under the names PAS 5161 or Bozepol C by the company Hoechst, Sepigel 305 by the company SEPPIC
by the company Allied Colloid, or
- the crosslinked methacryloyloxyethyltrimethylammonium chloride homopolymers sold under the name Salcare SC95 by the company Allied Colloid,
- associative polymers and especially associative polyurethanes.

Such thickeners are especially described in patent application EP-A-I 400 234, the content of which is incorporated herein by way of reference.

The oily-medium thickener may be chosen from:
- organophilic clays;
- hydrophobic fumed silicas;
- alkyl guar gums (with a C1-C6 alkyl group), such as those described in EP-A-708 114;
- oil-gelling polymers, for instance triblock polymers or star polymers resulting from the polymerization or copolymerization of at least one monomer containing an ethylenic group, for instance the polymers sold under the name Kraton;
- polymers with a weight-average molecular mass of less than 100 000, comprising a) a polymer backbone containing hydrocarbon-based repeating units containing at least one heteroatom, and optionally b) at least one
pendent fatty chain and/or at least one terminal fatty chain, which are optionally functionalized, containing from 6 to 120 carbon atoms and being linked to these hydrocarbon-based units, as described in patent applications WO-A-02/056847 and WO-A-02/47619, the content of which is incorporated by way of reference; in particular, polyamide resins (especially comprising alkyl groups containing from 12 to 22 carbon atoms) such as those described in US-A-5783657, the content of which is incorporated by way of reference; - the silicone-based polyamide resins as described in patent application EP-A-I 266 647 and in the French patent application filed under the number 0 216 039, the content of which is incorporated by way of reference.

Such thickeners are especially described in patent application EP-A-I 400 234, the content of which is incorporated by way of reference.

The thickener may be an organic gelling agent, i.e. an agent comprising at least one organic compound. The organogelling agents may be chosen from those described in patent application WO-A-03/105 788, the content of which is incorporated by way of reference.

More precisely, the polymeric thickener present in the composition according to the invention is an amorphous polymer formed by polymerization of an olefin. The olefin may especially be an elastomeric ethylenically unsaturated monomer.

Examples of olefins that may be mentioned include ethylenic carbide monomers especially containing one or two ethylenic unsaturations, containing from 2 to 5 carbon atoms, such as ethylene, propylene, butadiene or isoprene.

The polymeric thickener is capable of thickening or
gelling the composition. The term "amorphous polymer" means a polymer that does not have a crystalline form. The polymeric thickener may also be film-forming.

The polymeric thickener may especially be a diblock, triblock, multiblock, radial or star copolymer, or mixtures thereof.


Advantageously, the polymeric thickener is an amorphous block copolymer of styrene and of olefin.

The polymeric thickener is preferably hydrogenated to reduce the residual ethylenic unsaturations after polymerization of the monomers.

In particular, the polymeric thickener is an optionally hydrogenated copolymer, containing styrene blocks and ethylene/C3-C4 alkylene blocks.

Diblock copolymers, preferably hydrogenated, that may be mentioned include styrene-ethylene/propylene copolymers and styrene-ethylene/butadiene copolymers. The diblock polymers are especially sold under the name Kraton® G1701E by the company Kraton Polymers.

Triblock copolymers, which are preferably hydrogenated, that may be mentioned include styrene-ethylene/propylene-styrene copolymers, styrene-ethylene/butadiene-styrene copolymers, styrene-isoprene-styrene copolymers and styrene-butadiene-styrene copolymers. Triblock polymers are especially sold under the names Kraton® G1650, Kraton® G1652, Kraton® D101, Kraton® D1102 and Kraton® D1160 by the company Kraton Polymers.
A mixture of hydrogenated styrene-butadiene/ethylene-styrene triblock copolymer and of hydrogenated ethylene-propylene-styrene star polymer may also be used, such a mixture especially being in isododecane.

Such mixtures are sold, for example, by the company Penreco under the trade names Versagel® M5960 and Versagel® M5670.

A diblock copolymer such as those described above, in particular a styrene-ethylene/propylene diblock copolymer, is advantageously used as polymeric thickener.

More precisely, organophilic clays are clays modified with chemical compounds that make the clay able to swell.

Clays are products that are already well known per se, which are described, for example, in the publication "Mineralogie des argiles [Mineralogy of clays], S. Caillere, S. Henin, M. Rautureau, 2nd Edition 1982, Masson", the teaching of which is included herein by way of reference.

Clays are silicates containing a cation that may be chosen from calcium, magnesium, aluminium, sodium, potassium and lithium cations, and mixtures thereof.

Examples of such products that may be mentioned include clays of the smectite family such as montmorillonites, hectorites, bentonites, beidellites and saponites, and also of the vermiculite, stevensite and chlorite families.

These clays may be of natural or synthetic origin. Clays that are cosmetically compatible and acceptable with keratin materials such as the skin are preferably used.
The organophilic clay may be chosen from montmorillonite, bentonite, hectorite, attapulgite and sepiolite, and mixtures thereof. The clay is preferably a bentonite or a hectorite.

These clays may be modified with a chemical compound chosen from quaternary amines, tertiary amines, amine acetates, imidazolines, amine soaps, fatty sulfates, alkyl aryl sulfonates and amine oxides, and mixtures thereof.

Organophilic clays that may be mentioned include quaternium-18 bentonites such as those sold under the names Bentone 3, Bentone 38 and Bentone 38V by the company Rheox, Tixogel VP by the company United Catalyst, Claytone 34, Claytone 40 and Claytone XL by the company Southern Clay; stearalkonium bentonites such as those sold under the names Bentone 27 by the company Rheox, Tixogel LG by the company United Catalyst and Claytone AF and Claytone APA by the company Southern Clay; quaternium-18/benzalkonium bentonites such as those sold under the names Claytone HT and Claytone PS by the company Southern Clay.

The fumed silicas may be obtained by high-temperature hydrolysis of a volatile silicon compound in an oxhydric flame, producing a finely divided silica. This process makes it possible especially to obtain hydrophilic silicas having a large number of silanol groups at their surface. Such hydrophilic silicas are sold, for example, under the names Aerosil 130®, Aerosil 200®, Aerosil 255®, Aerosil 300® and Aerosil 380® by the company Degussa, and Cab-O-Sil HS-5®, Cab-O-Sil EH-5®, Cab-O-Sil LM-130®, Cab-O-Sil MS-55® and Cab-O-Sil M-5® by the company Cabot.

It is possible to chemically modify the surface of the said silica, via a chemical reaction generating a reduction in the number of silanol groups. It is
especially possible to substitute silanol groups with hydrophobic groups: a hydrophobic silica is then obtained.

5 The hydrophobic groups may be:
- trimethylsiloxy groups, which are obtained especially by treating fumed silica in the presence of hexamethyldisilazane. Silicas thus treated are known as "silica silylate" according to the CTFA (6th Edition, 1995). They are sold, for example, under the references Aerosil R812® by the company Degussa and Cab-O-Sil TS-530® by the company Cabot.
- dimethylsilyloxy or polydimethylsiloxane groups, which are obtained especially by treating fumed silica in the presence of polydimethylsiloxane or dimethyldichlorosilane. Silicas thus treated are known as "silica dimethyl silylate" according to the CTFA (6th Edition, 1995). They are sold, for example, under the references Aerosil R972® and Aerosil R974® by the company Degussa and Cab-O-Sil TS-610® and Cab-O-Sil TS-720® by the company Cabot.

The fumed silica preferably has a particle size that may be nanometric to micrometric, for example ranging from about 5 to 200 nm.

An organomodified bentonite or hectorite is preferably used as mineral thickener.

30 The thickener (s) may be present in the composition in a total content ranging from 0.1% to 10% by weight, preferably ranging from 0.5% to 7% by weight and more preferentially ranging from 0.5% to 5% by weight relative to the total weight of the composition.

The compositions in accordance with the invention may also contain one or more agents usually used in cosmetics, chosen, for example, from reducing agents, fatty substances, plasticizers, softeners, antifoams,
moisturizers, UV-screening agents, mineral colloids, peptizers, solubilizers, fragrances, proteins, vitamins, propellants, oxyethylenated or non-oxyethylenated waxes, paraffins, C10-C30 fatty acids such as stearic acid or lauric acid, and C10-C30 fatty amides such as lauric diethanolamide.

The above additives are generally present in an amount for each of them of between 0.01% and 20% by weight relative to the weight of the composition.

Needless to say, a person skilled in the art will take care to select this or these optional additives(s) such that the advantageous properties intrinsically associated with the formation of the coating in accordance with the invention are not, or are not substantially, adversely affected.

The composition according to the invention may especially be in the form of a suspension, a dispersion, a solution, a gel, an emulsion, especially an oil-in-water (O/W) or water-in-oil (W/O) emulsion or a multiple emulsion (W/O/W or polyol/O/W or O/W/O), in the form of a cream, a mousse, a stick, a dispersion of vesicles, especially of ionic or nonionic lipids, a two-phase or multiphase lotion, a spray, a powder or a paste.

The composition may be an anhydrous composition, i.e. a composition containing less than 2% by weight of water, or even less than 0.5% water, especially free of water, the water not being added during preparation of the composition but corresponding to the residual water provided by the mixed ingredients. The compositions may also be in the form of a lacquer.

The composition described above may be used on dry or wet hair. The additives described previously, when they are present, may be applied to the hair simultaneously
with the composition of the invention or separately. The composition may be rinsed out or left in. It is also possible subsequently to wash the hair, this washing not being obligatory.

An application process with heating may also be used. According to this particular mode, the application to the hair is performed, for example, using a comb, a fine brush, a coarse brush or the fingers.

The application of the composition is then followed by drying at a temperature above 400°C. According to one particular embodiment, this temperature is greater than 450°C. According to another particular embodiment, this temperature is greater than 450°C and less than 2200°C.

Drying may be performed immediately after the application or after a leave-on time that may range from 1 minute to 30 minutes.

Preferably, the hair is dried, in addition to supplying heat, with a flow of air. This flow of air during drying makes it possible to improve the individualization of the coating.

During drying, a mechanical action on the locks may be exerted, such as combing, brushing or running the fingers through.

The drying step of the process of the invention may be performed with a hood, a hairdryer, a smoothing iron, etc.

When the drying step is performed with a hood or a hairdryer, the drying temperature is between 40 and 110° and preferably between 50 and 90°.

When the drying step is performed with a smoothing iron, the drying temperature is between 110 and 220°.
and preferably between 140 and 200°.

Once the drying is complete, a final rinse or shampoo wash may optionally be performed.

The invention will be illustrated more fully using the non-limiting examples that follow.

**EXAMPLES**

Example 1:

The following compositions are produced:

<table>
<thead>
<tr>
<th>Composition</th>
<th>1</th>
<th>2</th>
<th>3 (outside the invention)</th>
</tr>
</thead>
<tbody>
<tr>
<td>BioPSA DC 7-4405 at 40% in isododecane, sold by Dow Corning</td>
<td>17.5 g</td>
<td>17.5 g</td>
<td>17.5 g</td>
</tr>
<tr>
<td>**α, ω-<strong>dihydroxylated PDMS gum of very high molecular weight</strong></td>
<td>1.5 g</td>
<td>1.5 g</td>
<td>1.5 g</td>
</tr>
<tr>
<td>Silica-coated bronze powder sold under the name Visionaire Honey by Eckart</td>
<td>5 g</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bronze powder sold under the name Standart Bronze Powder Offset 3000 Super Pale Gold by Eckart</td>
<td>-</td>
<td>5 g</td>
<td>-</td>
</tr>
<tr>
<td>Mica nacre coated with titanium oxide and with iron oxide, sold by Eckart under the name Prestige Sun Gold</td>
<td>-</td>
<td>-</td>
<td>5 g</td>
</tr>
<tr>
<td>Isododecane</td>
<td>qs 100 g</td>
<td>qs 100 g</td>
<td>qs 100 g</td>
</tr>
</tbody>
</table>
0.6 g of the composition 1 or 2 is applied to a 1 g lock of clean, wet, brown hair. After a leave-on time of 2 minutes, the lock is dried with a hairdryer at a temperature of 80°C for 2 minutes. A coloured lock whose hairs are individualized and whose colour is intense, very homogeneous and shampoo-remanent is obtained.

The composition 3 is applied to hair in the same conditions as those used for the compositions 1 and 2. When a lock is treated with the composition 6, the colour obtained is less intense and therefore less visible. The colour obtained is also less predictable, i.e. the coloration obtained on the locks is more remote from the colour of the composition.

**Example 2:**

The following compositions are prepared:

<table>
<thead>
<tr>
<th>Composition</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
</tr>
</thead>
<tbody>
<tr>
<td>BioPSA DC 7-4405 at 40% in isododecane, sold by Dow</td>
<td>17.5</td>
<td>17.5</td>
<td>17.5</td>
<td>17.5</td>
<td>17.5</td>
<td>17.5</td>
</tr>
<tr>
<td>Corning</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>0,0'-dihydroxylated PDMS gum of very high molecular</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
<td>1.5</td>
</tr>
<tr>
<td>weight</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silica-coated bronze powder sold under the name Visionaire</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Honey by Eckart</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silica-coated copper powder sold under the name Visionaire</td>
<td>-</td>
<td>5</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Ingredient Description</td>
<td>Quantity 1</td>
<td>Quantity 2</td>
<td>Quantity 3</td>
<td>Quantity 4</td>
<td>Quantity 5</td>
<td>Quantity 6</td>
</tr>
<tr>
<td>---------------------------------------------------------------------------------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
<td>------------</td>
</tr>
<tr>
<td>Cinnamon by Eckart</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Silica-coated aluminium powder sold under the name Visionaire Silver Sea by Eckart</td>
<td>-</td>
<td>-</td>
<td>5 g</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Silica-coated copper powder sold under the name Dorolan 10/0 Copper by Eckart</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5 g</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Bronze powder sold under the name Standart Bronze Powder Offset 3000 Super Pale Gold by Eckart</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>5 g</td>
<td>3 g</td>
</tr>
<tr>
<td>Mica nacre coated with brown iron oxide, sold by Eckart under the name Prestige Soft Bronze</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>2 g</td>
</tr>
<tr>
<td>Polymethyl-silsesquioxane sold under the name Wacker Belsil PMS MK Powder by the company Wacker</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Distearidimonium hectorite (10%) and propylene carbonate (3%) in isododecane, sold by Elementis</td>
<td>15 g</td>
<td>15 g</td>
<td>15 g</td>
<td>15 g</td>
<td>15 g</td>
<td>15 g</td>
</tr>
</tbody>
</table>
0.6 g of the composition 4, 5, 6, 7, 8 or 9 is applied to a 1 g lock of clean, wet, brown hair. After a leave-on time of 2 minutes, the lock is dried with a hairdryer at a temperature of 80°C for 2 minutes. A coloured lock whose hairs are individualized and whose colour is intense, very homogeneous and shampoo-remanent is obtained.

<table>
<thead>
<tr>
<th>under the name Bentone Gel ISD V</th>
</tr>
</thead>
<tbody>
<tr>
<td>Isododecane</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>0.6 g</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>
CLAIMS

1. Composition for treating keratin fibres, comprising one or more copolymers based on silicone resin and fluid silicone, one or more volatile solvents, and one or more metal particles comprising more than 80% of metals.

2. Composition according to Claim 1, in which the copolymer comprises the silicone resin in a content of between 45% and 75% and the fluid silicone in a content of between 25% and 55%, the sum of the percentages of silicone resin and of fluid silicone being equal to 100.

3. Composition according to Claim 1 or 2, in which the silicone resin is present in a content of between 55% and 65% and the fluid silicone is present in a content of between 35% and 45%, the sum of the percentages of silicone resin and of fluid silicone being equal to 100.

4. Composition according to any one of the preceding claims, in which the amount of copolymer is greater than 1% by weight relative to the total weight of the composition.

5. Composition according to any one of the preceding claims, in which the volatile solvent(s) is (are) chosen from water, non-silicone organic solvents and silicone organic solvents.

6. Composition according to any one of the preceding claims, in which the volatile solvent(s) is (are) chosen from water, ethanol, isopropanol, acetone, isododecane, decamethylcyclopentasiloxane, octamethyltrisiloxane, decamethyltetrasiloxane and dodecamethyl-
cyclohexasiloxane, or mixtures thereof.

7. Composition according to any one of the preceding claims, in which the metal particle(s) is (are) formed to at least 80% from one or more metals.

8. Composition according to any one of the preceding claims, in which the metal particle(s) is (are) chosen from silver, aluminium, iron, chromium, nickel, molybdenum, gold, copper, zinc, tin, magnesium, steel, bronze, titanium and alloys of these metals.

9. Composition according to any one of the preceding claims, in which the metal particles have a shape factor of greater than or equal to 8.

10. Composition according to any one of the preceding claims, in which the metal core of the particle(s) is coated with at least one layer of silicon oxide $\text{SiO}_2$.

11. Composition according to any one of the preceding claims, in which the metal particle(s) is (are) present in an amount of between 0.1% and 40% and preferably from 0.5% to 20% by weight relative to the total weight of the composition.

12. Composition according to any one of the preceding claims, comprising one or more linear non-volatile polydimethylsiloxanes with a viscosity of greater than 100 cSt chosen from polydimethylsiloxanes; alkyl dimethicones; polyphenylmethylsiloxanes; and also silicones modified with optionally fluorinated aliphatic and/or aromatic groups, or with functional groups chosen from the hydroxyl, thiol and amine groups.

13. Composition according to any one of the preceding claims comprising one or more pigments, preferably
nacres.

14. Composition according to any one of the preceding claims comprising one or more pigments, preferably nacres.

15. Composition according to any one of the preceding claims, which is anhydrous.

16. Process for treating keratin fibres comprising the application of a composition as defined in any one of Claims 1 to 13, this application being able to be followed by drying at a temperature above 40°C.