

HYBRID MICROCAPSULES COMPRISING A REGENERATED BIOPOLYMER

Technical Field

The present invention relates to hybrid microcapsules, with a hydrophobic material-based core, preferably a perfume, and a polymeric shell comprising a regenerated biopolymer. Process for preparing said microcapsules is also an object of the invention. Perfuming compositions and consumer products comprising said microcapsules, in particular perfumed consumer products in the form of home care or personal care products, are also part of the invention.

Background of the Invention

One of the problems faced by the perfumery industry lies in the relatively rapid loss of olfactive benefit provided by odoriferous compounds due to their volatility, particularly that of “top-notes”. In order to tailor the release rates of volatiles, delivery systems such as microcapsules containing a perfume, are needed to protect and later release the core payload when triggered. A key requirement from the industry regarding these systems is to survive suspension in challenging bases without physically dissociating or degrading. For instance, fragranced personal and household cleansers containing high levels of aggressive surfactant detergents are very challenging for the stability of microcapsules.

Aminoplast microcapsules formed of a melamine-formaldehyde resin have been largely used to encapsulate hydrophobic actives, thus protecting said actives and providing their controlled release. However, capsules such as aminoplast ones suffer from stability problems when used in consumer products comprising surfactants, such as perfumery consumer products, especially after prolonged storage at elevated temperatures. In such products, even though the capsule wall remains intact, the encapsulated active tends to leak out of the capsule by diffusion through the wall due to the presence of surfactants that are able to solubilise the encapsulated active in the product base. The leakage phenomenon reduces the efficiency of the capsules to protect the active and provide its controlled release.

A variety of strategies have been described to improve the stability of oil core-based microcapsules. Cross-linking of capsule walls, with chemical groups such as poly(amines) and poly(isocyanates), has been described as a way to improve stability of microcapsules.

WO2011/154893 discloses for instance a process for the preparation of polyurea microcapsules using a combination of aromatic and aliphatic polyisocyanates in specific relative concentrations.

Stabilization of oil/water interfaces with inorganic particles has been described in so-called Pickering emulsions. In this context, functionalization of inorganic particles to allow their cross-linking is known. For instance, Pickering emulsions cross-linked from an outer water phase with polyelectrolytes providing electrostatic interactions have been the object of prior disclosures (Li Jian et al. in Langmuir (2010), 26(19), 15554-15560). However, such systems are very likely to dissociate in a surfactant base or in ethanol over time as electrostatic interactions are insufficient to promote stability. Covalent cross-linking has also been described in relation with Pickering emulsion in the preparation of colloidosomes. In particular, the use of diisocyanates as cross-linker has been disclosed in scientific publications. WO2009/063257 also describes the use of polyisocyanates as possible cross-linker for surface-modified inorganic particles in order to prepare microcapsules with increased level of protection from UV light for the contents. These products are typically intended for agrochemical applications. This type of system is not suitable for perfume encapsulation. In fact, in order to maintain a good morphology and permeability of the microcapsules, an excess of surface-modified inorganic particles is needed. Another problem is that these microcapsules show little margin for size adjustment. Furthermore, the amount of adsorbed particles at the oil-water interface is limited which affects the properties of the capsule membranes.

Moreover, in addition to the performance in terms of stability and olfactive performance, the consumer demand for eco-friendly delivery systems is more and more important and is driving the development of new delivery systems.

There is therefore still a need to provide new microcapsules using more eco-friendly materials, while not compromising on the performance of the microcapsules, in particular in terms of stability in a challenging medium such as a consumer product base, as well as in delivering a good performance in terms of active ingredient delivery, e.g. olfactive performance in the case of perfuming ingredients.

Summary of the Invention

A first aspect of the invention is therefore a core-shell microcapsule comprising:

- a) an oil-based core comprising a hydrophobic material, preferably a perfume oil; and

b) a polymeric shell comprising a regenerated biopolymer.

In a second aspect of the invention is a core-shell microcapsule slurry comprising at least a microcapsule made of:

a) an oil-based core comprising a hydrophobic material, preferably a perfume oil; and

5 b) a polymeric shell comprising a regenerated biopolymer.

A third aspect of the invention is a process for preparing core-shell microcapsules or a core-shell microcapsule slurry as defined above, wherein the process comprises the steps of:

1) suspending in water a regenerated biopolymer to form a water phase;

2) preparing an oil phase comprising a hydrophobic material, preferably a perfume oil;

10 3) adding the oil phase to the water phase and mixing them to form an oil-in-water Pickering emulsion, under conditions allowing the formation of core-shell microcapsule by interfacial polymerization and/or interfacial reaction,

wherein a polyfunctional monomer is added in step 1) in the water phase and/or in step 2) in the oil phase or and/or in step 3) in the emulsion.

15 In a fourth aspect, the invention concerns a microcapsule or a microcapsule slurry obtainable by such a process as well as perfuming compositions and consumer products containing them.

In a last aspect, the invention relates to the use of a regenerated biopolymer, for the stabilization of a Pickering emulsion further subjected to an interfacial polymerization and/or
20 interfacial reaction.

Detailed Description of the Invention.

Unless stated otherwise, percentages (%) are meant to designate percent by weight of a composition.

25 By “**hydrophobic material**”, it is meant a material which forms a two-phase dispersion when mixed with water. According to the invention, the hydrophobic material can be “inert” material like solvents or active ingredients. According to an embodiment, the hydrophobic material is a hydrophobic active ingredient.

By “**active ingredient**”, it is meant a single compound or a combination of ingredients.

30 By “**perfume oil**”, it is meant a single perfuming or a mixture of several perfuming compounds.

By “**consumer product**” or “**end-product**” it is meant a manufactured product ready to be distributed, sold and used by a consumer.

A “**microcapsule**”, or the similar, in the present invention has a morphology that can vary from a core-shell to a matrix type. According to one embodiment, it is of the core-shell type. In this case, the microcapsules comprise a core based on a hydrophobic material, typically a perfume, and a polymeric shell comprising a regenerated biopolymer.

Typically, microcapsules have a particle size distribution in the micron range (e.g. a mean diameter) comprised between about 1 and 3000 microns, preferably comprised between 1 and 1000 microns, more preferably between 1 and 500 microns, and even more preferably between 5 and 50 microns.

The polymeric shell of the microcapsule according to the present invention is formed by interfacial polymerization and/or interfacial reaction in the presence of a regenerated biopolymer. More particularly, the polymeric shell is formed by a reaction between a polyfunctional monomer, and optionally a reactant, in the presence of a regenerated biopolymer. The regenerated biopolymer can participate to the polymeric shell formation and/or interact with the polymeric shell.

By “**microcapsule slurry**”, it is meant microcapsule(s) that is (are) dispersed in a liquid. According to an embodiment, the microcapsule(s) is (are) dispersed in water.

By “**particle size**” it is meant an average diameter of particles based on size distribution measured by dynamic light scattering (DLS) using Zetasizer Nano ZS equipment from Malvern Instruments Ltd., UK when particles are dispersed into a water phase.

By “**microcapsules size**” it is meant the volume mean diameter (D[4,3]) of the relevant microcapsules, microcapsules suspension as obtained by laser light scattering of a diluted sample in a Malvern Mastersizer 3000.

By “**regenerated biopolymer**”, it is meant a biopolymer made from natural biopolymer (or natural crude raw materials) and can be obtained by dissolving, precipitation and re-dispersion treatment process. More particularly, by “regenerated biopolymer” it is meant a biopolymer made from natural biopolymer (or natural crude raw materials) and can be obtained by dissolving the natural biopolymer into a solvent (typically a different solvent from water), followed by a precipitation (typically by using an anti-solvent such as water) or self-assembly, and followed by a re-dispersion treatment process.

The natural biopolymer (i.e natural crude raw materials) are typically water insoluble biopolymer materials from nature. The regenerated biopolymer is also typically water insoluble.

The regenerated biopolymer is typically in a colloidal state (micro-/nano-fibrous structure, network structure) or in a particle state when dispersing into a water phase.

5 The regenerated biopolymer can be used as a single regenerated biopolymer or as a mixture of regenerated biopolymers.

“Regenerated polymer” and “regenerated biopolymer” are used indifferently in the present invention.

By “**polyfunctional monomer**”, it is meant a molecule that, as unit, reacts or binds
10 chemically to form a polymer or a supramolecular polymer. The polyfunctional monomer is oil soluble or water soluble. The polyfunctional monomer of the invention has at least two functional groups that are capable to react with or bind to functional groups of another component (for example regenerated biopolymer particles) and/or are capable to polymerize to form a polymeric shell. The wording “shell” and “wall” are used indifferently in the present invention.

15 By “**polyurea-based**” wall or shell, it is meant that the polymeric shell comprises urea linkages produced by either an amino-functional crosslinker or hydrolysis of isocyanate groups to produce amino groups capable of further reacting with isocyanate groups during interfacial polymerization. According to a particular embodiment, polyurea-based capsules are formed in the absence of added amine reactant.

20 It has now surprisingly been found that performing core-shell microcapsules encapsulating a hydrophobic material, for example a perfume oil, could be obtained when a regenerated biopolymer is comprised within the shell. The microcapsules of the invention therefore provide a solution to the above-mentioned problems as it improves the storage stability in challenging bases even with a low concentration of polymeric material in the shell.

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CORE-SHELL MICROCAPSULE

A first object of the invention is a core-shell microcapsule comprising:

- a) an oil-based core comprising a hydrophobic material, preferably a perfume oil; and
- b) a polymeric shell comprising a regenerated biopolymer.

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Hydrophobic material

The hydrophobic material according to the invention can be “inert” material like solvents or active ingredients.

When hydrophobic materials are active ingredients, they are preferably chosen from the group consisting of flavors, flavor ingredients, perfumes, perfume ingredients, nutraceuticals, cosmetics, pest control agents, biocide actives, malodour counteracting ingredient, and mixtures thereof. According to an embodiment, the hydrophobic material is not a pest control agent and/or a biocide active.

According to an embodiment, the hydrophobic material is not a phase change material (PCM). According to a particular embodiment, the hydrophobic material comprises a mixture of a perfume with another ingredient selected from the group consisting of nutraceuticals, cosmetics, pest control agents and biocide actives.

According to a particular embodiment, the hydrophobic material comprises a mixture of biocide actives with another ingredient selected from the group consisting of perfumes, nutraceuticals, cosmetics, pest control agents.

According to a particular embodiment, the hydrophobic material comprises a mixture of pest control agents with another ingredient selected from the group consisting of perfumes, nutraceuticals, cosmetics, biocide actives.

According to a particular embodiment, the hydrophobic material comprises a perfume.

According to a particular embodiment, the hydrophobic material consists of a perfume.

According to a particular embodiment, the hydrophobic material consists of biocide actives.

According to a particular embodiment, the hydrophobic material consists of pest control agents.

By “perfume” (or also “perfume oil”) what is meant here is an ingredient or a composition that is a liquid at about 20°C. According to any one of the above embodiments said perfume oil can be a perfuming ingredient alone or a mixture of ingredients in the form of a perfuming composition. As a “perfuming ingredient” it is meant here a compound, which is used for the primary purpose of conferring or modulating an odor. In other words such an ingredient, to be considered as being a perfuming one, must be recognized by a person skilled in the art as being able to at least impart or modify in a positive or pleasant way the odor of a composition, and not

just as having an odor. For the purpose of the present invention, perfume oil also includes a combination of perfuming ingredients with substances which together improve, enhance or modify the delivery of the perfuming ingredients, such as perfume precursors, modulators, emulsions or dispersions, as well as combinations which impart an additional benefit beyond that of modifying or imparting an odor, such as long-lastingness, blooming, malodor counteraction, antimicrobial effect, microbial stability, pest control.

The nature and type of the perfuming ingredients present in the oil phase do not warrant a more detailed description here, which in any case would not be exhaustive, the skilled person being able to select them on the basis of its general knowledge and according to intended use or application and the desired organoleptic effect. In general terms, these perfuming ingredients belong to chemical classes as varied as alcohols, aldehydes, ketones, esters, ethers, acetates, nitriles, terpenoids, nitrogenous or sulfurous heterocyclic compounds and essential oils (for example Thyme oil), and said perfuming co-ingredients can be of natural or synthetic origin. Many of these co-ingredients are in any case listed in reference texts such as the book by S. Arctander, Perfume and Flavor Chemicals, 1969, Montclair, New Jersey, USA, or its more recent versions, or in other works of a similar nature, as well as in the abundant patent literature in the field of perfumery.

In particular one may cite perfuming ingredients which are commonly used in perfume formulations, such as:

- Aldehydic ingredients: decanal, dodecanal, 2-methyl-undecanal, 10-undecenal, octanal, nonanal and/or nonenal;
- Aromatic-herbal ingredients: eucalyptus oil, camphor, eucalyptol, 5-methyltricyclo[6.2.1.0^{2,7}]undecan-4-one, 1-methoxy-3-hexanethiol, 2-ethyl-4,4-dimethyl-1,3-oxathiane, 2,2,7/8,9/10-tetramethylspiro[5.5]undec-8-en-1-one, menthol and/or alpha-pinene;
- Balsamic ingredients: coumarin, ethylvanillin and/or vanillin;
- Citrus ingredients: dihydromyrcenol, citral, orange oil, linalyl acetate, citronellyl nitrile, orange terpenes, limonene, 1-p-menthen-8-yl acetate and/or 1,4(8)-p-menthadiene;
- Floral ingredients: methyl dihydrojasmonate, linalool, citronellol, phenylethanol, 3-(4-tert-butylphenyl)-2-methylpropanal, hexylcinnamic aldehyde, benzyl acetate, benzyl salicylate, tetrahydro-2-isobutyl-4-methyl-4(2H)-pyranol, beta ionone, methyl 2-

- (methylamino)benzoate, (E)-3-methyl-4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-3-buten-2-one, (1E)-1-(2,6,6-trimethyl-2-cyclohexen-1-yl)-1-penten-3-one, 1-(2,6,6-trimethyl-1,3-cyclohexadien-1-yl)-2-buten-1-one, (2E)-1-(2,6,6-trimethyl-2-cyclohexen-1-yl)-2-buten-1-one, (2E)-1-[2,6,6-trimethyl-3-cyclohexen-1-yl]-2-buten-1-one, (2E)-1-(2,6,6-trimethyl-1-cyclohexen-1-yl)-2-buten-1-one, 3-(3,3/1,1-dimethyl-5-indanyl)propanal, 2,5-dimethyl-2-indanmethanol, 2,6,6-trimethyl-3-cyclohexene-1-carboxylate, 3-(4,4-dimethyl-1-cyclohexen-1-yl)propanal, hexyl salicylate, 3,7-dimethyl-1,6-nonadien-3-ol, 3-(4-isopropylphenyl)-2-methylpropanal, verdyl acetate, geraniol, p-menth-1-en-8-ol, 4-(1,1-dimethylethyl)-1-cyclohexyle acetate, 1,1-dimethyl-2-phenylethyl acetate, 4-cyclohexyl-2-methyl-2-butanol, amyl salicylate, high cis methyl dihydrojasmonate, 3-methyl-5-phenyl-1-pentanol, verdyl propionate, geranyl acetate, tetrahydro linalool, cis-7-p-menthanol, propyl (S)-2-(1,1-dimethylpropoxy)propanoate, 2-methoxynaphthalene, 2,2,2-trichloro-1-phenylethyl acetate, 4/3-(4-hydroxy-4-methylpentyl)-3-cyclohexene-1-carbaldehyde, amylcinnamic aldehyde, 8-decen-5-olide, 4-phenyl-2-butanone, isononyl acetate, 4-(1,1-dimethylethyl)-1-cyclohexyl acetate, verdyl isobutyrate and/or mixture of methylionones isomers;
- Fruity ingredients: gamma-undecalactone, 2,2,5-trimethyl-5-pentylcyclopentanone, 2-methyl-4-propyl-1,3-oxathiane, 4-decanolide, ethyl 2-methyl-pentanoate, hexyl acetate, ethyl 2-methylbutanoate, gamma-nonolactone, allyl heptanoate, 2-phenoxyethyl isobutyrate, ethyl 2-methyl-1,3-dioxolane-2-acetate, diethyl 1,4-cyclohexanedicarboxylate, 3-methyl-2-hexen-1-yl acetate, 1-[3,3-dimethylcyclohexyl]ethyl [3-ethyl-2-oxiranyl]acetate and/or diethyl 1,4-cyclohexane dicarboxylate;
 - Green ingredients: 2-methyl-3-hexanone (E)-oxime, 2,4-dimethyl-3-cyclohexene-1-carbaldehyde, 2-tert-butyl-1-cyclohexyl acetate, styrallyl acetate, allyl (2-methylbutoxy)acetate, 4-methyl-3-decen-5-ol, diphenyl ether, (Z)-3-hexen-1-ol and/or 1-(5,5-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one;
 - Musk ingredients: 1,4-dioxo-5,17-cycloheptadecanedione, (Z)-4-cyclopentadecen-1-one, 3-methylcyclopentadecanone, 1-oxa-12-cyclohexadecen-2-one, 1-oxa-13-cyclohexadecen-2-one, (9Z)-9-cycloheptadecen-1-one, 2-[(1S)-1-[(1R)-3,3-dimethylcyclohexyl]ethoxy]-2-oxoethyl propionate, 3-methyl-5-cyclopentadecen-1-one,

- 4,6,6,7,8,8-hexamethyl-1,3,4,6,7,8-hexahydrocyclopenta[g]isochromene, (1S,1'R)-2-[1-(3',3'-dimethyl-1'-cyclohexyl)ethoxy]-2-methylpropyl propanoate, oxacyclohexadecan-2-one and/or (1S,1'R)-[1-(3',3'-dimethyl-1'-cyclohexyl)ethoxycarbonyl]methyl propanoate;
- Woody ingredients: 1-[(1RS,6SR)-2,2,6-trimethylcyclohexyl]-3-hexanol, 3,3-dimethyl-5-[(1R)-2,2,3-trimethyl-3-cyclopenten-1-yl]-4-penten-2-ol, 3,4'-dimethylspiro[oxirane-2,9'-tricyclo[6.2.1.0^{2,7}]undec[4]ene, (1-ethoxyethoxy)cyclododecane, 2,2,9,11-tetramethylspiro[5.5]undec-8-en-1-yl acetate, 1-(octahydro-2,3,8,8-tetramethyl-2-naphthalenyl)-1-ethanone, patchouli oil, terpenes fractions of patchouli oil, Clearwood®, (1'R,E)-2-ethyl-4-(2',2',3'-trimethyl-3'-cyclopenten-1'-yl)-2-buten-1-ol, 2-ethyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)-2-buten-1-ol, methyl cedryl ketone, 5-(2,2,3-trimethyl-3-cyclopentenyl)-3-methylpentan-2-ol, 1-(2,3,8,8-tetramethyl-1,2,3,4,6,7,8,8a-octahydronaphthalen-2-yl)ethan-1-one and/or isobornyl acetate;
 - Other ingredients (e.g. amber, powdery spicy or watery): dodecahydro-3a,6,6,9a-tetramethyl-naphtho[2,1-b]furan and any of its stereoisomers, heliotropin, anisic aldehyde, eugenol, cinnamic aldehyde, clove oil, 3-(1,3-benzodioxol-5-yl)-2-methylpropanal, 7-methyl-2H-1,5-benzodioxepin-3(4H)-one, 2,5,5-trimethyl-1,2,3,4,4a,5,6,7-octahydro-2-naphthalenol, 1-phenylvinyl acetate, 6-methyl-7-oxa-1-thia-4-azaspiro[4.4]nonane and/or 3-(3-isopropyl-1-phenyl)butanal.

It is also understood that said ingredients may also be compounds known to release in a controlled manner various types of perfuming compounds also known as properfume or profragrance. Non-limiting examples of suitable properfumes may include 4-(dodecylthio)-4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-2-butanone, 4-(dodecylthio)-4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-2-butanone, 3-(dodecylthio)-1-(2,6,6-trimethyl-3-cyclohexen-1-yl)-1-butanone, 2-(dodecylthio)octan-4-one, 2-phenylethyl oxo(phenyl)acetate, 3,7-dimethylocta-2,6-dien-1-yl oxo(phenyl)acetate, (Z)-hex-3-en-1-yl oxo(phenyl)acetate, 3,7-dimethyl-2,6-octadien-1-yl hexadecanoate, bis(3,7-dimethylocta-2,6-dien-1-yl) succinate, (2-((2-methylundec-1-en-1-yl)oxy)ethyl)benzene, 1-methoxy-4-(3-methyl-4-phenethoxybut-3-en-1-yl)benzene, (3-methyl-4-phenethoxybut-3-en-1-yl)benzene, 1-(((Z)-hex-3-en-1-yl)oxy)-2-methylundec-1-ene, (2-((2-methylundec-1-en-1-yl)oxy)ethoxy)benzene, 2-methyl-1-(octan-3-yloxy)undec-1-ene, 1-methoxy-4-(1-phenethoxyprop-1-en-2-yl)benzene, 1-methyl-4-(1-phenethoxyprop-1-en-2-yl)benzene, 2-(1-phenethoxyprop-1-en-2-yl)naphthalene, (2-phenethoxyvinyl)benzene, 2-(1-((3,7-dimethyloct-6-

en-1-yl)oxy)prop-1-en-2-yl)naphthalene, (2-((2-pentylcyclopentylidene)methoxy)ethyl)benzene, 4-allyl-2-methoxy-1-((2-methoxy-2-phenylvinyl)oxy)benzene, (2-((2-heptylcyclopentylidene)methoxy)ethyl)benzene, 1-isopropyl-4-methyl-2-((2-pentylcyclopentylidene)methoxy)benzene, 2-methoxy-1-((2-pentylcyclopentylidene)methoxy)-4-propylbenzene, 3-methoxy-4-((2-methoxy-2-phenylvinyl)oxy)benzaldehyde, 4-((2-(hexyloxy)-2-phenylvinyl)oxy)-3-methoxybenzaldehyde or a mixture thereof.

The perfuming ingredients may be dissolved in a solvent of current use in the perfume industry. The solvent is preferably not an alcohol. Examples of such solvents are diethyl phthalate, isopropyl myristate, Abalyn[®] (rosin resins, available from Eastman), benzyl benzoate, ethyl citrate, triethyl citrate, limonene or other terpenes, or isoparaffins. Preferably, the solvent is very hydrophobic and highly sterically hindered, like for example Abalyn[®] or benzyl benzoate. Preferably the perfume comprises less than 30% of solvent. More preferably the perfume comprises less than 20% and even more preferably less than 10% of solvent, all these percentages being defined by weight relative to the total weight of the perfume. Most preferably, the perfume is essentially free of solvent.

Preferred perfuming ingredients are those having a high steric hindrance (i.e bulky materials) and in particular those from one of the following groups:

- Group 1: perfuming ingredients comprising a cyclohexane, cyclohexene, cyclohexanone or cyclohexenone ring substituted with at least one linear or branched C₁ to C₄ alkyl or alkenyl substituent;
- Group 2: perfuming ingredients comprising a cyclopentane, cyclopentene, cyclopentanone or cyclopentenone ring substituted with at least one linear or branched C₄ to C₈ alkyl or alkenyl substituent;
- Group 3: perfuming ingredients comprising a phenyl ring or perfuming ingredients comprising a cyclohexane, cyclohexene, cyclohexanone or cyclohexenone ring substituted with at least one linear or branched C₅ to C₈ alkyl or alkenyl substituent or with at least one phenyl substituent and optionally one or more linear or branched C₁ to C₃ alkyl or alkenyl substituents;
- Group 4: perfuming ingredients comprising at least two fused or linked C₅ and/or C₆ rings;
- Group 5: perfuming ingredients comprising a camphor-like ring structure;
- Group 6: perfuming ingredients comprising at least one C₇ to C₂₀ ring structure;

- Group 7: perfuming ingredients having a logP value above 3.5 and comprising at least one tert-butyl or at least one trichloromethyl substituent;

Examples of ingredients from each of these groups are:

- Group 1: 2,4-dimethyl-3-cyclohexene-1-carbaldehyde (origin: Firmenich SA, Geneva, Switzerland), isocyclocitral, menthone, isomenthone, methyl 2,2-dimethyl-6-methylene-1-cyclohexanecarboxylate (origin: Firmenich SA, Geneva, Switzerland), nerone, terpineol, dihydroterpineol, terpenyl acetate, dihydroterpenyl acetate, dipentene, eucalyptol, hexylate, rose oxide, (S)-1,8-p-menthadiene-7-ol (origin: Firmenich SA, Geneva, Switzerland), 1-p-menthene-4-ol, (1RS,3RS,4SR)-3-p-mentanyl acetate, (1R,2S,4R)-4,6,6-trimethyl-bicyclo[3,1,1]heptan-2-ol, tetrahydro-4-methyl-2-phenyl-2H-pyran (origin: Firmenich SA, Geneva, Switzerland), cyclohexyl acetate, cyclanol acetate, 1,4-cyclohexane diethyldicarboxylate (origin: Firmenich SA, Geneva, Switzerland), (3RS,3aRS,6SR,7ASR)-perhydro-3,6-dimethyl-benzo[B]furan-2-one (origin: Firmenich SA, Geneva, Switzerland), ((6R)-perhydro-3,6-dimethyl-benzo[B]furan-2-one (origin: Firmenich SA, Geneva, Switzerland), 2,4,6-trimethyl-4-phenyl-1,3-dioxane, 2,4,6-trimethyl-3-cyclohexene-1-carbaldehyde;
- Group 2: (E)-3-methyl-5-(2,2,3-trimethyl-3-cyclopenten-1-yl)-4-penten-2-ol (origin: Givaudan SA, Vernier, Switzerland), (1'R,E)-2-ethyl-4-(2',2',3'-trimethyl-3'-cyclopenten-1'-yl)-2-buten-1-ol (origin: Firmenich SA, Geneva, Switzerland), (1'R,E)-3,3-dimethyl-5-(2',2',3'-trimethyl-3'-cyclopenten-1'-yl)-4-penten-2-ol (origin: Firmenich SA, Geneva, Switzerland), 2-heptylcyclopentanone, methyl-cis-3-oxo-2-pentyl-1-cyclopentane acetate (origin: Firmenich SA, Geneva, Switzerland), 2,2,5-trimethyl-5-pentyl-1-cyclopentanone (origin: Firmenich SA, Geneva, Switzerland), 3,3-dimethyl-5-(2,2,3-trimethyl-3-cyclopenten-1-yl)-4-penten-2-ol (origin: Firmenich SA, Geneva, Switzerland), 3-methyl-5-(2,2,3-trimethyl-3-cyclopenten-1-yl)-2-pentanol (origin: Givaudan SA, Vernier, Switzerland);
- Group 3: damascones, 1-(5,5-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one (origin: Firmenich SA, Geneva, Switzerland), (1'R)-2-[2-(4'-methyl-3'-cyclohexen-1'-yl)propyl]cyclopentanone, alpha-ionone, beta-ionone, damascenone, mixture of 1-(5,5-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one and 1-(3,3-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one (origin: Firmenich SA, Geneva, Switzerland), 1-(2,6,6-trimethyl-1-cyclohexen-1-yl)-2-buten-1-one (origin: Firmenich SA, Geneva, Switzerland), (1S,1'R)-[1-(3',3'-Dimethyl-1'-

- cyclohexyl)ethoxycarbonyl]methyl propanoate (origin: Firmenich SA, Geneva, Switzerland), 2-tert-butyl-1-cyclohexyl acetate (origin: International Flavors and Fragrances, USA), 1-(2,2,3,6-tetramethyl-cyclohexyl)-3-hexanol (origin: Firmenich SA, Geneva, Switzerland), trans-1-(2,2,6-trimethyl-1-cyclohexyl)-3-hexanol (origin: Firmenich SA, Geneva, Switzerland), (E)-3-methyl-4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-3-buten-2-one, terpenyl isobutyrate, 4-(1,1-dimethylethyl)-1-cyclohexyl acetate (origin: Firmenich SA, Geneva, Switzerland), 8-methoxy-1-p-menthene, (1S,1'R)-2-[1-(3',3'-dimethyl-1'-cyclohexyl)ethoxy]-2-methylpropyl propanoate (origin: Firmenich SA, Geneva, Switzerland), para tert-butylcyclohexanone, menthenethiol, 1-methyl-4-(4-methyl-3-pentenyl)-3-cyclohexene-1-carbaldehyde, allyl cyclohexylpropionate, cyclohexyl salicylate, 2-methoxy-4-methylphenyl methyl carbonate, ethyl 2-methoxy-4-methylphenyl carbonate, 4-ethyl-2-methoxyphenyl methyl carbonate;
- Group 4: Methyl cedryl ketone (origin: International Flavors and Fragrances, USA), a mixture of (1RS,2SR,6RS,7RS,8SR)-tricyclo[5.2.1.0^{2,6}]dec-3-en-8-yl 2-methylpropanoate and (1RS,2SR,6RS,7RS,8SR)-tricyclo[5.2.1.0^{2,6}]dec-4-en-8-yl 2-methylpropanoate, vetyverol, vetyverone, 1-(octahydro-2,3,8,8-tetramethyl-2-naphthalenyl)-1-ethanone (origin: International Flavors and Fragrances, USA), (5RS,9RS,10SR)-2,6,9,10-tetramethyl-1-oxaspiro[4.5]deca-3,6-diene and the (5RS,9SR,10RS) isomer, 6-ethyl-2,10,10-trimethyl-1-oxaspiro[4.5]deca-3,6-diene, 1,2,3,5,6,7-hexahydro-1,1,2,3,3-pentamethyl-4-indenone (origin: International Flavors and Fragrances, USA), a mixture of 3-(3,3-dimethyl-5-indanyl)propanal and 3-(1,1-dimethyl-5-indanyl)propanal (origin: Firmenich SA, Geneva, Switzerland), 3',4-dimethyl-tricyclo[6.2.1.0(2,7)]undec-4-ene-9-spiro-2'-oxirane (origin: Firmenich SA, Geneva, Switzerland), 9/10-ethyldiene-3-oxatricyclo[6.2.1.0(2,7)]undecane, (perhydro-5,5,8A-trimethyl-2-naphthalenyl acetate (origin: Firmenich SA, Geneva, Switzerland), octalynol, (dodecahydro-3a,6,6,9a-tetramethyl-naphtho[2,1-b]furan, origin: Firmenich SA, Geneva, Switzerland), tricyclo[5.2.1.0(2,6)]dec-3-en-8-yl acetate and tricyclo[5.2.1.0(2,6)]dec-4-en-8-yl acetate as well as tricyclo[5.2.1.0(2,6)]dec-3-en-8-yl propanoate and tricyclo[5.2.1.0(2,6)]dec-4-en-8-yl propanoate, (+)-(1S,2S,3S)-2,6,6-trimethyl-bicyclo[3.1.1]heptane-3-spiro-2'-cyclohexen-4'-one;
- Group 5: camphor, borneol, isobornyl acetate, 8-isopropyl-6-methyl-bicyclo[2.2.2]oct-5-ene-2-carbaldehyde, pinene, camphene, 8-methoxycedrane, (8-methoxy-2,6,6,8-tetramethyl-

- tricyclo[5.3.1.0(1,5)]undecane (origin: Firmenich SA, Geneva, Switzerland), cedrene, cedrenol, cedrol, mixture of 9-ethylidene-3-oxatricyclo[6.2.1.0(2,7)]undecan-4-one and 10-ethylidene-3-oxatricyclo[6.2.1.0^{2,7}]undecan-4-one (origin: Firmenich SA, Geneva, Switzerland), 3-methoxy-7,7-dimethyl-10-methylene-bicyclo[4.3.1]decane (origin: Firmenich SA, Geneva, Switzerland);
- 5 -
- Group 6: (trimethyl-13-oxabicyclo-[10.1.0]-trideca-4,8-diene (origin: Firmenich SA, Geneva, Switzerland), 9-hexadecen-16-olide (origin: Firmenich SA, Geneva, Switzerland), pentadecenolide (origin: Firmenich SA, Geneva, Switzerland), 3-methyl-(4/5)-cyclopentadecenone (origin: Firmenich SA, Geneva, Switzerland), 3-methylcyclopentadecanone (origin: Firmenich SA, Geneva, Switzerland), pentadecanolide (origin: Firmenich SA, Geneva, Switzerland), cyclopentadecanone (origin: Firmenich SA, Geneva, Switzerland), 1-ethoxyethoxycyclododecane (origin: Firmenich SA, Geneva, Switzerland), 1,4-dioxacycloheptadecane-5,17-dione, 4,8-cyclododecadien-1-one;
- 10 -
- Group 7: (+-)-2-methyl-3-[4-(2-methyl-2-propanyl)phenyl]propanal (origin: Givaudan SA, Vernier, Switzerland), 2,2,2-trichloro-1-phenylethyl acetate.
- 15

Preferably, the perfume comprises at least 30%, preferably at least 50%, more preferably at least 60% of ingredients selected from Groups 1 to 7, as defined above. More preferably said perfume comprises at least 30%, preferably at least 50% of ingredients from Groups 3 to 7, as defined above. Most preferably said perfume comprises at least 30%, preferably at least 50% of ingredients from Groups 3, 4, 6 or 7, as defined above.

20

According to another preferred embodiment, the perfume comprises at least 30%, preferably at least 50%, more preferably at least 60% of ingredients having a logP above 3, preferably above 3.5 and even more preferably above 3.75.

According to a particular embodiment, the perfume used in the invention contains less than 10% of its own weight of primary alcohols, less than 15% of its own weight of secondary alcohols and less than 20% of its own weight of tertiary alcohols. Advantageously, the perfume used in the invention does not contain any primary alcohols and contains less than 15% of secondary and tertiary alcohols.

25

According to an embodiment, the oil phase (or the oil-based core) comprises:

- 30 -
- 25-100wt% of a perfume oil comprising at least 15wt% of high impact perfume raw materials having a Log T<-4, and

- 0-75wt% of a density balancing material having a density greater than 1.07 g/cm³.

“*High impact perfume raw materials*” should be understood as perfume raw materials having a LogT<-4. The odor threshold concentration of a chemical compound is determined in part by its shape, polarity, partial charges and molecular mass. For convenience, the odor threshold concentration is presented as the common logarithm of the threshold concentration, i.e., Log [Threshold] (“LogT”).

A “*density balancing material*” should be understood as a material having a density greater than 1.07 g/cm³ and having preferably low or no odor.

The odor threshold concentration of a perfuming compound is determined by using a gas chromatograph (“GC”). Specifically, the gas chromatograph is calibrated to determine the exact volume of the perfume oil ingredient injected by the syringe, the precise split ratio, and the hydrocarbon response using a hydrocarbon standard of known concentration and chain-length distribution. The air flow rate is accurately measured and, assuming the duration of a human inhalation to last 12 seconds, the sampled volume is calculated. Since the precise concentration at the detector at any point in time is known, the mass per volume inhaled is known and hence the concentration of the perfuming compound. To determine the threshold concentration, solutions are delivered to the sniff port at the back-calculated concentration. A panelist sniffs the GC effluent and identifies the retention time when odor is noticed. The average across all panelists determines the odor threshold concentration of the perfuming compound. The determination of odor threshold is described in more detail in C. Vuilleumier et al., *Multidimensional Visualization of Physical and Perceptual Data Leading to a Creative Approach in Fragrance Development*, *Perfume & Flavorist*, Vol. 33, September., 2008, pages 54-61.

The nature of high impact perfume raw materials having a Log T<-4 and density balancing material having a density greater than 1.07 g/cm³ are described in WO2018115250, the content of which are included by reference.

According to an embodiment, the high impact perfume raw materials having a Log T<-4 are selected from the group consisting of (+-)-1-methoxy-3-hexanethiol, 4-(4-hydroxy-1-phenyl)-2-butanone, 2-methoxy-4-(1-propenyl)-1-phenyl acetate, pyrazobutyle, 3-propylphenol, 1-(3-methyl-1-benzofuran-2-yl)ethanone, 2-(3-phenylpropyl)pyridine, 1-(3,3/5,5-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one, 1-(5,5-dimethyl-1-cyclohexen-1-yl)-4-penten-1-one, a mixture comprising (3RS,3aRS,6SR,7ASR)-perhydro-3,6-dimethyl-benzo[b]furan-2-one and

(3SR,3aRS,6SR,7ASR)-perhydro-3,6-dimethyl-benzo[b]furan-2-one, (+-)-1-(5-ethyl-5-methyl-1-cyclohexen-1-yl)-4-penten-1-one, (1'S,3'R)-1-methyl-2-[(1',2',2'-trimethylbicyclo[3.1.0]hex-3'-yl)methyl]cyclopropyl}methanol, (+-)-3-mercaptohexyl acetate, (2E)-1-(2,6,6-trimethyl-1,3-cyclohexadien-1-yl)-2-buten-1-one, H-methyl-2h-1,5-benzodioxepin-3(4H)-one, (2E,6Z)-2,6-nonadien-1-ol, (4Z)-4-dodecenal, (+-)-4-hydroxy-2,5-dimethyl-3(2H)-furanone, methyl 2,4-dihydroxy-3,6-dimethylbenzoate, 3-methylindole, (+-)-perhydro-4alpha,8abeta-dimethyl-4a-naphthalenol, patchoulol, 2-methoxy-4-(1-propenyl)phenol, mixture comprising (+-)-5,6-dihydro-4-methyl-2-phenyl-2H-pyran and tetrahydro-4-methylene-2-phenyl-2H-pyran, mixture comprising 4-methylene-2-phenyltetrahydro-2H-pyran and (+-)-4-methyl-2-phenyl-3,6-dihydro-2H-pyran, 4-hydroxy-3-methoxybenzaldehyde, nonylenic aldehyde, 2-methoxy-4-propylphenol, 3-methyl-5-phenyl-2-pentenitrile, 1-(spiro[4.5]dec-6/7-en-7-yl)-4-penten-1-one, 2-methoxynaphthalene, (-)-(3aR,5AS,9AS,9BR)-3a,6,6,9a-tetramethyldodecahydronaphtho[2,1-b]furan, 5-nonanolide, (3aR,5AS,9AS,9BR)-3a,6,6,9a-tetramethyldodecahydronaphtho[2,1-b]furan, 7-isopropyl-2H,4H-1,5-benzodioxepin-3-one, coumarin, 4-methylphenyl isobutyrate, (2E)-1-(2,6,6-trimethyl-1,3-cyclohexadien-1-yl)-2-buten-1-one, beta,2,2,3-tetramethyl-delta-methylene-3-cyclopentene-1-butanol, delta damascone ((2E)-1-[(1RS,2SR)-2,6,6-trimethyl-3-cyclohexen-1-yl]-2-buten-1-one), (+-)-3,6-dihydro-4,6-dimethyl-2-phenyl-2h-pyran, anisaldehyde, paracresol, 3-ethoxy-4-hydroxybenzaldehyde, methyl 2-aminobenzoate, ethyl methylphenylglycidate, octalactone gamma, ethyl 3-phenyl-2-propenoate, (-)-(2E)-2-ethyl-4-[(1R)-2,2,3-trimethyl-3-cyclopenten-1-yl]-2-buten-1-ol, paracresyl acetate, dodecalactone, tricyclone, (+)-(3R,5Z)-3-methyl-5-cyclopentadecen-1-one, undecalactone, (1R,4R)-8-mercapto-3-p-menthanone, (3S,3AS,6R,7AR)-3,6-dimethylhexahydro-1-benzofuran-2(3H)-one, beta ionone, (+-)-6-pentyltetrahydro-2H-pyran-2-one, (3E,5Z)-1,3,5-undecatriene, 10-undecenal, (9E)-9-undecenal (9Z)-9-undecenal, (Z)-4-decenal, (+-)-ethyl 2-methylpentanoate, 1,2-diallyldisulfane, 2-tridecenenitrile, 3-tridecenenitrile, , (+-)-2-ethyl-4,4-dimethyl-1,3-oxathiane, (+)-(3R,5Z)-3-methyl-5-cyclopentadecen-1-one, 3-(4-tert-butylphenyl)propanal, allyl (cyclohexyloxy)acetate, methylnaphthylketone, (+-)-(4E)-3-methyl-4-cyclopentadecen-1-one, (+-)-5E3-methyl-5-cyclopentadecen-1-one, cyclopropylmethyl 3-hexenoate, (4E)-4-methyl-5-(4-methylphenyl)-4-pentenal, (+-)-1-(5-propyl-1,3-benzodioxol-2-yl)ethanone, 4-methyl-2-pentylpyridine, (+-)-(E)-3-methyl-4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-3-buten-2-one, (3aRS,5aSR,9aSR,9bRS)-3a,6,6,9a-tetramethyldodecahydronaphtho[2,1-b]furan, (2S,5R)-5-

methyl-2-(2-propanyl)cyclohexanone oxime, 6-hexyltetrahydro-2H-pyran-2-one, (+)-3-(3-isopropyl-1-phenyl)butanal, methyl 2-(3-oxo-2-pentylcyclopentyl)acetate, 1-(2,6,6-trimethyl-1-cyclohex-2-enyl)pent-1-en-3-one, indol, 7-propyl-2H,4H-1,5-benzodioxepin-3-one, ethyl praline, (4-methylphenoxy)acetaldehyde, ethyl tricyclo[5.2.1.0.^{2,6}]decane-2-carboxylate, (+)-(1'S,2S,E)-
 5 3,3-dimethyl-5-(2',2',3'-trimethyl-3'-cyclopenten-1'-yl)-4-penten-2-ol, (4E)-3,3-dimethyl-5-[(1R)-2,2,3-trimethyl-3-cyclopenten-1-yl]-4-penten-2-ol, 8-isopropyl-6-methyl-bicyclo[2.2.2]oct-5-ene-2-carbaldehyde, methylnonylacetalddehyde, 4-formyl-2-methoxyphenyl 2-methylpropanoate, (E)-4-decenal, (+)-2-ethyl-4-(2,2,3-trimethyl-3-cyclopenten-1-yl)-2-buten-1-ol, (1R,5R)-4,7,7-trimethyl-6-thiabicyclo[3.2.1]oct-3-ene, (1R,4R,5R)-4,7,7-trimethyl-6-thiabicyclo[3.2.1]octane,
 10 (-)-(3R)-3,7-dimethyl-1,6-octadien-3-ol, (E)-3-phenyl-2-propenenitrile, 4-methoxybenzyl acetate, (E)-3-methyl-5-(2,2,3-trimethyl-3-cyclopenten-1-yl)-4-penten-2-ol, allyl (2/3-methylbutoxy)acetate, (+)-(2E)-1-(2,6,6-trimethyl-2-cyclohexen-1-yl)-2-buten-1-one, (1E)-1-(2,6,6-trimethyl-1-cyclohexen-1-yl)-1-penten-3-one, and mixtures thereof.

According to an embodiment, perfume raw materials having a Log T<-4 are chosen in the
 15 group consisting of aldehydes, ketones, alcohols, phenols, esters lactones, ethers, epoxides, nitriles and mixtures thereof.

According to an embodiment, perfume raw materials having a Log T<-4 comprise at least one compound chosen in the group consisting of alcohols, phenols, esters lactones, ethers, epoxydes, nitriles and mixtures thereof, preferably in amount comprised between 20 and 70% by
 20 weight based on the total weight of the perfume raw materials having a Log T<-4.

According to an embodiment, perfume raw materials having a Log T<-4 comprise between 20 and 70% by weight of aldehydes, ketones, and mixtures thereof based on the total weight of the perfume raw materials having a Log T<-4.

The remaining perfume raw materials contained in the oil-based core may have therefore
 25 a Log T>-4.

According to an embodiment, the perfume raw materials having a Log T>-4 are chosen in the group consisting of ethyl 2-methylbutyrate, (E)-3-phenyl-2-propenyl acetate, (+)-6/8-sec-butylquinoline, (+)-3-(1,3-benzodioxol-5-yl)-2-methylpropanal, verdyl propionate, 1-(octahydro-2,3,8,8-tetramethyl-2-naphtalenyl)-1-ethanone, methyl 2-((1RS,2RS)-3-oxo-2-pentylcyclopentyl)acetate, (+)-(E)-4-methyl-3-decen-5-ol, 2,4-dimethyl-3-cyclohexene-1-carbaldehyde, 1,3,3-trimethyl-2-oxabicyclo[2.2.2]octane, tetrahydro-4-methyl-2-(2-methyl-1-

propenyl)-2H-pyran, dodecanal, 1-oxa-12/13-cyclohexadecen-2-one, (+-)-3-(4-isopropylphenyl)-2-methylpropanal, aldehyde C11, (+-)-2,6-dimethyl-7-octen-2-ol, allyl 3-cyclohexylpropanoate, (Z)-3-hexenyl acetate, 5-methyl-2-(2-propenyl)cyclohexanone, allyl heptanoate, 2-(2-methyl-2-propenyl)cyclohexyl acetate, 1,1-dimethyl-2-phenylethyl butyrate, geranyl acetate, neryl acetate, (+)-1-phenylethyl acetate, 1,1-dimethyl-2-phenylethyl acetate, 3-methyl-2-butenyl acetate, ethyl 3-oxobutanoate, (2Z)-ethyl 3-hydroxy-2-butenate, 8-p-menthanol, 8-p-menthanyl acetate, 1-p-menthanyl acetate, (+-)-2-(4-methyl-3-cyclohexen-1-yl)-2-propenyl acetate, (+-)-2-methylbutyl butanoate, 2-[(1S)-1-[(1R)-3,3-dimethylcyclohexyl]ethoxy]-2-oxoethyl propionate, 3,5,6-trimethyl-3-cyclohexene-1-carbaldehyde, 2,4,6-trimethyl-3-cyclohexene-1-carbaldehyde, 2-cyclohexylethyl acetate, octanal, ethyl butanoate, (+-)-(3E)-4-(2,6,6-trimethyl-1/2-cyclohexen-1-yl)-3-buten-2-one, 1-[(1R,6SR)-2,2,6-trimethylcyclohexyl]-3-hexanol, 1,3,3-trimethyl-2-oxabicyclo[2.2.2]octane, 1,3,3-trimethyl-2-oxabicyclo[2.2.2]octane, ethyl hexanoate, undecanal, decanal, 2-phenylethyl acetate, (1S,2S,4S)-1,7,7-trimethylbicyclo[2.2.1]heptan-2-ol, (1S,2R,4S)-1,7,7-trimethylbicyclo[2.2.1]heptan-2-ol), (+-)-3,7-dimethyl-3-octanol, 1-methyl-4-(2-propenylidene)cyclohexene, (+)-(R)-4-(2-methoxypropan-2-yl)-1-methylcyclohex-1-ene, verdyl acetate, (3R)-1-[(1R,6S)-2,2,6-trimethylcyclohexyl]-3-hexanol, (3S)-1-[(1R,6S)-2,2,6-trimethylcyclohexyl]-3-hexanol, (3R)-1-[(1S,6S)-2,2,6-trimethylcyclohexyl]-3-hexanol, (+)-(1S,1'R)-2-[1-(3',3'-dimethyl-1'-cyclohexyl)ethoxy]-2-methylpropyl propanoate, and mixtures thereof.

- According to an embodiment, the perfume formulation comprises
- 0 to 60 wt.% of a hydrophobic solvent (based on the total weight of the perfume formulation),
 - 40 to 100 wt.% of a perfume oil (based on the total weight of the perfume formulation),
- wherein the perfume oil has at least two, preferably all of the following characteristics:
- at least 35%, preferably at least 40%, preferably at least 50%, more preferably at least 60% of perfuming ingredients having a log P above 3, preferably above 3.5,
 - at least 20%, preferably at least 25%, preferably at least 30%, more preferably at least 40% of Bulky materials of groups 1 to 6, preferably 3 to 6 as previously defined and

- at least 15%, preferably at least 20%, more preferably at least 25%, even more preferably at least 30% of high impact perfume materials having a Log T < -4 as defined previously,

optionally, further hydrophobic active ingredients.

5 According to a particular embodiment, the perfume comprises 0 to 60 wt.% of a hydrophobic solvent.

According to a particular embodiment, the hydrophobic solvent is a density balancing material preferably chosen in the group consisting of benzyl salicylate, benzyl benzoate, cyclohexyl salicylate, benzyl phenylacetate, phenylethyl phenylacetate, triacetin, ethyl citrate,
10 methyl and ethyl salicylate, benzyl cinnamate, and mixtures thereof.

In a particular embodiment, the hydrophobic solvent has Hansen Solubility Parameters compatible with entrapped perfume oil.

The term "Hansen solubility parameter" is understood refers to a solubility parameter approach proposed by Charles Hansen used to predict polymer solubility and was developed
15 around the basis that the total energy of vaporization of a liquid consists of several individual parts. To calculate the "weighted Hansen solubility parameter" one must combine the effects of (atomic) dispersion forces, (molecular) permanent dipole-permanent dipole forces, and (molecular) hydrogen bonding (electron exchange). The weighted Hansen solubility parameter" is calculated as $(\delta D^2 + \delta P^2 + \delta H^2)^{0.5}$, wherein δD is the Hansen dispersion value (also referred to in the following
20 as the atomic dispersion fore), δP is the Hansen polarizability value (also referred to in the following as the dipole moment), and δH is the Hansen Hydrogen-bonding ("h-bonding") value (also referred to in the following as hydrogen bonding). For a more detailed description of the parameters and values, see Charles Hansen, The Three Dimensional Solubility Parameter and Solvent Diffusion Coefficient, Danish Technical Press (Copenhagen, 1967).

25 Euclidean difference in solubility parameter between a fragrance and a solvent is calculated as $(4 * (\delta D_{\text{solvent}} - \delta D_{\text{fragrance}})^2 + (\delta P_{\text{solvent}} - \delta P_{\text{fragrance}})^2 + (\delta H_{\text{solvent}} - \delta H_{\text{fragrance}})^2)^{0.5}$, in which $\delta D_{\text{solvent}}$, $\delta P_{\text{solvent}}$, and $\delta H_{\text{solvent}}$, are the Hansen dispersion value, Hansen polarizability value, and Hansen h-bonding values of the solvent, respectively; and $\delta D_{\text{fragrance}}$, $\delta P_{\text{fragrance}}$, and $\delta H_{\text{fragrance}}$ are the Hansen dispersion value, Hansen polarizability value, and Hansen h-bonding values of the fragrance,
30 respectively.

In a particular embodiment, the perfume oil and the hydrophobic solvent have at least two Hansen solubility parameters selected from a first group consisting of: an atomic dispersion force (δD) from 12 to 20, a dipole moment (δP) from 1 to 8, and a hydrogen bonding (δH) from 2.5 to 11.

5 In a particular embodiment, the perfume oil and the hydrophobic solvent have at least two Hansen solubility parameters selected from a second group consisting of: an atomic dispersion force (δD) from 12 to 20, preferably from 14 to 20, a dipole moment (δP) from 1 to 8, preferably from 1 to 7, and a hydrogen bonding (δH) from 2.5 to 11, preferably from 4 to 11.

10 In a particular embodiment, at least 90% of the perfume oil, preferably at least 95% of the perfume oil, most preferably at least of 98% of the perfume oil has at least two Hansen solubility parameters selected from a first group consisting of: an atomic dispersion force (δD) from 12 to 20, a dipole moment (δP) from 1 to 8, and a hydrogen bonding (δH) from 2.5 to 11.

15 In a particular embodiment, the perfume oil and the hydrophobic solvent have at least two Hansen solubility parameters selected from a second group consisting of: an atomic dispersion force (δD) from 12 to 20, preferably from 14 to 20, a dipole moment (δP) from 1 to 8, preferably from 1 to 7, and a hydrogen bonding (δH) from 2.5 to 11, preferably from 4 to 11.

According to an embodiment, the perfuming formulation comprises a fragrance modulator (that can be used in addition to the hydrophobic solvent when present or as substitution of the hydrophobic solvent when there is no hydrophobic solvent).

20 Preferably, the fragrance modulator is defined as a fragrance material with

- i. a vapor pressure of less than 0.0008 Torr at 22°C;
- ii. a clogP of 3.5 and higher, preferably 4.0 and higher and more preferably 4.5
- iii. at least two Hansen solubility parameters selected from a first group consisting of: an atomic dispersion force from 12 to 20, a dipole moment from 1 to 7, and a
25 hydrogen bonding from 2.5 to 11,
- iv. at least two Hansen solubility parameters selected from a second group consisting of: an atomic dispersion force from 14 to 20, a dipole moment from 1 to 8, and a hydrogen bonding from 4 to 11, when in solution with a compound having a vapor pressure range of 0.0008 to 0.08 Torr at 22°C.

30 Preferably, as examples the following ingredients can be listed as modulators but the list is not limited to the following materials: alcohol C12, oxacyclohexadec-12/13-en-2-one, 3-[(2',2',3'-

trimethyl-3'-cyclopenten-1'-yl)methoxy]-2-butanol, cyclohexadecanone, (Z)-4-cyclopentadecen-1-one, cyclopentadecanone, (8Z)-oxacycloheptadec-8-en-2-one, 2-[5-(tetrahydro-5-methyl-5-vinyl-2-furyl)-tetrahydro-5-methyl-2-furyl]-2-propanol, muguet aldehyde, 1,5,8-trimethyl-13-oxabicyclo[10.1.0]trideca-4,8-diene, (+)-4,6,6,7,8,8-hexamethyl-1,3,4,6,7,8-hexahydrocyclopenta[g]isochromene, (+)-(1S,2S,3S,5R)-2,6,6-trimethylspiro[bicyclo[3.1.1]heptane-3,1'-cyclohexane]-2'-en-4'-one, oxacyclohexadecan-2-one, 2-[(1S)-1-[(1R)-3,3-dimethylcyclohexyl]ethoxy]-2-oxoethyl propionate, (+)-(4R,4aS,6R)-4,4a-dimethyl-6-(1-propen-2-yl)-4,4a,5,6,7,8-hexahydro-2(3H)-naphthalenone, amylcinnamic aldehyde, hexylcinnamic aldehyde, hexyl salicylate, (1E)-1-(2,6,6-trimethyl-1-cyclohexen-1-yl)-1,6-heptadien-3-one, (9Z)-9-cycloheptadecen-1-one.

According to a particular embodiment, the hydrophobic material is free of any active ingredient (such as perfume). According to this particular embodiment, it comprises, preferably consists of hydrophobic solvents, preferably chosen in the group consisting of isopropyl myristate, tryglycerides (e.g. Neobee® MCT oil, vegetable oils), D-limonene, silicone oil, mineral oil, and mixtures thereof with optionally hydrophilic solvents preferably chosen in the group consisting of 1,4-butanediol, benzyl alcohol, triethyl citrate, triacetin, benzyl acetate, ethyl acetate, propylene glycol (1,2-propanediol), 1,3-propanediol, dipropylene glycol, glycerol, glycol ethers and mixtures thereof.

The term "biocide" refers to a chemical substance capable of killing living organisms (e.g. microorganisms) or reducing or preventing their growth and/or accumulation. Biocides are commonly used in medicine, agriculture, forestry, and in industry where they prevent the fouling of, for example, water, agricultural products including seed, and oil pipelines. A biocide can be a pesticide, including a fungicide, herbicide, insecticide, algicide, molluscicide, miticide and rodenticide; and/or an antimicrobial such as a germicide, antibiotic, antibacterial, antiviral, antifungal, antiprotozoal and/or antiparasite.

As used herein, a "pest control agent" indicates a substance that serves to repel or attract pests, to decrease, inhibit or promote their growth, development or their activity. Pests refer to any living organism, whether animal, plant or fungus, which is invasive or troublesome to plants or animals, pests include insects notably arthropods, mites, spiders, fungi, weeds, bacteria and other microorganisms.

According to any one of the invention's embodiments, the hydrophobic material can represent between about 10% and 60% w/w, or even between 15% and 45% w/w, by weight, relative to the total weight of the oil phase.

According to a particular embodiment, the oil phase essentially consists of the
5 polyfunctional monomer and a perfume or flavor oil.

According to an embodiment, solvents such as benzyle benzoate, ethyl acetate, butyl acetate, triethyl citrate, neobee can be added in the oil phase.

According to an embodiment, catalysts such as organotin catalysts (e.g., dibutyltin dilaurate, stannous octoate, stannous acetate, bis(dodecylthio)dibutyltin), bismuth catalysts (e.g.,
10 bismuth neodecanoate, bismuth laurate, bismuth octoate, bismuth naphthenate) and tertiary amines can be added in the oil phase.

Polymeric shell

According to an embodiment, the polymeric shell comprises a polymeric material.

15 According to an embodiment, the polymeric shell comprises (or is made of) a polymeric material selected from the group consisting of polyurea, polyurethane, polyamide, polyester, polyacrylate, polysiloxane, polycarbonate, polysulfonamide, polymers of urea and formaldehyde, melamine and formaldehyde, melamine and urea, or melamine and glyoxal and mixtures thereof.

According to a particular embodiment, the polymeric material is polyurea and/or
20 polyurethane.

According to a particular embodiment, the polymeric material is polyamide.

According to an embodiment, the polymeric material is present in an amount less than 30% by weight based on the total weight of the microcapsule.

According to another embodiment, the polymeric material is present in an amount less than
25 20% by weight based on the total weight of the microcapsule.

According to another embodiment, the polymeric material is present in an amount less than 10% by weight based on the total weight of the microcapsule.

According to an embodiment, the polymeric material is present in an amount less than 12% by weight based on the total weight of the microcapsule slurry.

30 According to another embodiment, the polymeric material is present in an amount less than 8% by weight based on the total weight of the microcapsule slurry.

According to another embodiment, the polymeric material is present in an amount less than 5% by weight based on the total weight of the microcapsule slurry.

Indeed, it has been underlined that even with a reduced amount of the polymeric material forming the shell, microcapsules still show good stability in consumer products.

5 In a particular embodiment, the shell material comprises a biodegradable material.

In a particular embodiment, the shell has a biodegradability of at least 40%, preferably at least 45%, 50%, 60%, 65%, 70%, 75%, 80%, 85%, 90%, 95% or 98%, within 60 days according to OECD301F.

10 In a particular embodiment, the core-shell microcapsule has a biodegradability of at least 40 %, preferably at least 60 %, preferably at least 65%, 70%, 75%, 80%, 85%, 90%, 95% or 98% within 60 days according to OECD301F.

Thereby it is understood that the core-shell microcapsule including all components, such as the core, shell and optionally coating can have a biodegradability of at least 40 %, preferably at least 60 %, preferably at least 65%, 70%, 75%, 80%, 85%, 90%, 95% or 98% within 60 days according to OECD301F.

15 OECD301F is a standard test method on the biodegradability from the Organization of Economic Co-operation and Development.

A typical method for extracting the shell for measuring the biodegradability is disclosed in *Gasparini and all in Molecules 2020, 25,718*.

20

Regenerated biopolymer

According to an embodiment, the regenerated biopolymer comprised in the shell are in the form of particles, typically in the form of solid particles.

25 According to another embodiment, regenerated biopolymer comprised in the shell are in the form of micro-/nano-fibrous structure or network structure.

According to an embodiment, the regenerated biopolymer is embedded within the shell.

According to an embodiment, the regenerated biopolymer is insoluble in water (“insoluble regenerated biopolymer”).

30 A “insoluble regenerated biopolymer” is intended for the purpose of the present invention as encompassing any regenerated biopolymer which forms a two-phases solution in water. Preferably, it forms a two phases solution when dissolved in water at concentrations as high as

20% by weight, more preferably even as high as 50% by weight. Most preferably it forms a two phases solution when dissolved in water at any concentration. Preferably, the insoluble regenerated biopolymer forms a uniform dispersion (or uniform suspension) in water.

Preferred regenerated biopolymer suspension are those having biopolymer content
5 between 0.01% to 10%, more preferably between 0.01% to 5.0% by weight based on the total weight of the suspension.

The regenerated biopolymer is comprised within the polymeric shell, meaning that it preferably participates to the polymeric shell formation and have covalent bond interactions with the polymeric shell, or incorporates into the polymeric shell or/and adheres to the polymeric shell
10 under non-covalent interactions.

According to a particular embodiment, the regenerated biopolymer is chosen from the group consisting of regenerated cellulose, regenerated chitin, regenerated lignocellulose, regenerated silk fibroin, regenerated pectin, regenerated alginic acid and mixtures thereof.

According to a particular embodiment, the regenerated biopolymer is chosen from the
15 group consisting of regenerated cellulose, regenerated chitin, regenerated lignocellulose, regenerated silk fibroin, regenerated alginic acid and mixtures thereof.

Regenerated biopolymer is prepared from natural biopolymer (i.e crude raw materials).

Chitin is the most common polysaccharide in nature besides cellulose and is used for structure formation. It differs from cellulose by an acetamide group and is a natural fiber, which
20 is found in fungi as well as in articulata and molluscs. Regenerated chitin can be made from Crude chitin powder.

Regenerated cellulose and regenerated lignocellulose can be made from one of the following natural biopolymers: Wood pulp, Bamboo pulp, Cotton fabric, Tree bark, Corn stalk, Bagasse, Reed, Straw.

25 Regenerated silk fibroin, regenerated pectin and regenerated alginic acid can be made from one of the following natural biopolymers: Cocoon silks, Raw pectin and alginic acid, respectively.

The regenerated biopolymer can be prepared by using different methods well-known from the person skilled in the art.

The regenerated biopolymer can be obtained by dissolving, precipitation and re-dispersion
30 treatment process.

According to an embodiment, the regenerated biopolymer is obtained by a process comprising the steps of:

- (i) Dispersing a natural biopolymer into water and/or dissolving a natural biopolymer into a solvent to form a homogeneous solution
- 5 (ii) Adding an anti-solvent into the solution obtained in step (i) or removing the solvent from the solution obtained in step (i) to obtain a precipitated biopolymer
- (iii) Dispersing the precipitated biopolymer into water and treating via high-pressure homogenizer to obtain a regenerated biopolymer suspension.

In step ii), the precipitated biopolymer can be obtained by self-assembly or precipitation,
10 preferably by precipitation.

In step iii), the precipitated biopolymer is dispersed into water and treated preferably via high-pressure homogenizer but a high mechanical agitation using for example a mixer (high power) can also be used.

A typical high-pressure homogenizer that can be used is APV 2000; SPX Flow Technology,
15 Germany. The pressure applied are typically comprised between 50 and 950 bar, preferably between 80 and 850 bar.

In an embodiment, regenerated biopolymer can be obtained by a process, wherein it comprises

- a) dissolving a natural biopolymer into a solvent to obtain a homogenous solution,
- 20 b) inducing self-assembly or precipitation from the homogenous solution of step a) to obtain a precipitated biopolymer.

In step b), the precipitated biopolymer can be obtained by self-assembly or precipitation, preferably by precipitation.

In step b), the biopolymer can precipitate from the homogenous solution of step a) by
25 adding an anti-solvent to the biopolymer solution or/and by removing the solvent from the homogeneous solution.

The person skilled in the art will be able to select suitable solvent(s) or anti-solvent(s).

As non-limiting examples of solvent, one may cite for example 4-methylmorpholine N-oxide solution, ionic liquid, acid (such as for example phosphoric acid, sulfuric acid), acetone,
30 alkaline solution, and mixtures thereof.

As non-limiting examples of anti-solvent, one may cite for example water, acid solution, a salt solution and mixtures thereof.

Optional components

- 5 When microcapsules are in the form of a slurry, the microcapsule slurry can comprise auxiliary ingredients selected from the group of thickening agents/rheology modifiers, antimicrobial agents, opacity-building agents, mica particles, salt, pH stabilizers/buffering ingredients, preferably in an amount comprised between 0 and 15% by weight based on the total weight of the slurry.
- 10 According to another embodiment, the microcapsule slurry of the invention comprises additional free (i.e non-encapsulated) perfume, preferably in an amount comprised between 5 and 50% by weight based on the total weight of the slurry.

Optional outer coating

- 15 According to a particular embodiment of the invention, microcapsules according to the invention comprise an outer coating material selected from the group consisting of a polysaccharide, a cationic polymer, a polysuccinimide derivative (as described for instance in WO2021185724) and mixtures thereof to form an outer coating to the microcapsule.

- Polysaccharide polymers are well known to a person skilled in the art. Preferred non-ionic polysaccharides are selected from the group consisting of locust bean gum, xyloglucan, guar gum, hydroxypropyl guar, hydroxypropyl cellulose and hydroxypropyl methyl cellulose, pectin and mixtures thereof.
- 20

 According to a particular embodiment, the coating consists of a cationic coating.

- Cationic polymers are also well known to a person skilled in the art. Preferred cationic polymers have cationic charge densities of at least 0.5 meq/g, more preferably at least about 1.5 meq/g, but also preferably less than about 7 meq/g, more preferably less than about 6.2 meq/g. The cationic charge density of the cationic polymers may be determined by the Kjeldahl method as described in the US Pharmacopoeia under chemical tests for Nitrogen determination. The preferred cationic polymers are chosen from those that contain units comprising primary, secondary, tertiary and/or quaternary amine groups that can either form part of the main polymer chain or can be borne by a side substituent directly connected thereto. The weight average (Mw) molecular weight
- 25
- 30

of the cationic polymer is preferably between 10,000 and 3.5M Dalton, more preferably between 50,000 and 2M Dalton.

According to a particular embodiment, one will use cationic polymers based on acrylamide, methacrylamide, N-vinylpyrrolidone, quaternized N,N-dimethylaminomethacrylate, diallyldimethylammonium chloride, quaternized vinylimidazole (3-methyl-1-vinyl-1H-imidazol-3-ium chloride), vinylpyrrolidone, acrylamidopropyltrimonium chloride, cassia hydroxypropyltrimonium chloride, guar hydroxypropyltrimonium chloride or polygalactomannan 2-hydroxypropyltrimethylammonium chloride ether, starch hydroxypropyltrimonium chloride and cellulose hydroxypropyltrimonium chloride. Preferably copolymers shall be selected from the group consisting of polyquaternium-5, polyquaternium-6, polyquaternium-7, polyquaternium-10, polyquaternium-11, polyquaternium-16, polyquaternium-22, polyquaternium-28, polyquaternium-43, polyquaternium-44, polyquaternium-46, cassia hydroxypropyltrimonium chloride, guar hydroxypropyltrimonium chloride or polygalactomannan 2-hydroxypropyltrimethylammonium chloride ether, starch hydroxypropyltrimonium chloride and cellulose hydroxypropyltrimonium chloride

As specific examples of commercially available products, one may cite Salcare® SC60 (cationic copolymer of acrylamidopropyltrimonium chloride and acrylamide, origin: BASF) or Luviquat®, such as the PQ 11N, FC 550 or Style (polyquaternium-11 to 68 or quaternized copolymers of vinylpyrrolidone origin: BASF), or also the Jaguar® (C13S or C17, origin Rhodia).

According to any one of the above embodiments of the invention, there is added an amount of polymer described above comprised between about 0% and 5% w/w, or even between about 0.1% and 2% w/w, percentage being expressed on a w/w basis relative to the total weight of the the microcapsules or the slurry. It is clearly understood by a person skilled in the art that only part of said added polymers will be incorporated into/deposited on the microcapsule shell.

PROCESS FOR PREPARING CORE-SHELL MICROCAPSULE

Core-shell microcapsules of the invention can be prepared according different processes depending notably on the nature of the polymeric wall.

Another object of the invention is a process for preparing core-shell microcapsules as defined above, wherein the process comprises the steps of:

- 1) suspending in water a regenerated biopolymer to form a water phase;

2) preparing an oil phase comprising a hydrophobic material, preferably a perfume oil;
3) adding the oil phase to the water phase and mixing them to form an oil-in-water Pickering emulsion, under conditions allowing the formation of core-shell microcapsule by interfacial polymerization and/or interfacial reaction,

5 wherein a polyfunctional monomer is added in step 1) in the water phase and/or in step 2) in the oil phase and/or in step 3) in the emulsion.

According to an embodiment, a polyfunctional monomer is added in step 1) in the water phase and/or in step 2) in the oil phase.

According to an embodiment, step 3) comprises:

- 10
- Step 3a) adding the oil phase into the water phase to form an oil-in-water Pickering emulsion, followed by
 - Step 3b) applying conditions allowing the reaction (by interfacial polymerization and/or interfacial reaction) of the polyfunctional monomer to form polymeric shell at oil-water interface in the presence of a regenerated biopolymer.

15 According to an embodiment, the regenerated biopolymer in step 1) is in the form of a suspension (biopolymer is in the format of micro-/nano-fibrous structure, network structure or particles dispersed in water).

According to a particular embodiment, the interfacial polymerization and/or interfacial reaction takes place between the polyfunctional monomer and the regenerated biopolymer.

20 According to this embodiment, the shell is formed via the reaction between the polyfunctional monomer in oil, with regenerated biopolymer, water and/or additional reactants in water phase at oil-in-water interface.

According to an embodiment, the polyfunctional monomer is chosen in the group consisting of at least one polyisocyanate, poly maleic anhydride, poly acid chloride (acyl chloride),
25 polyepoxide, acrylate monomers, polyalkoxysilane, melamine-based resin and mixtures thereof.

“Poly acid chloride” and “acyl chloride” are used indifferently in the present invention.

According to an embodiment, the polyfunctional monomer is added in the oil phase in step 2).

The previous embodiment is particularly suitable, when the polyfunctional monomer is soluble in oil (for example when polyisocyanate is used as a polyfunctional monomer).

30 According to an embodiment, the polyfunctional monomer is added in the water phase in step 1).

The previous embodiment is particularly suitable, when the polyfunctional monomer is soluble in water (for example when a melamine resin is used as a polyfunctional monomer).

According to an embodiment, the polyfunctional monomer is added in the emulsion in step 3).

5 According to an embodiment, a first polyfunctional monomer is added in the water phase in step 1) (for example a melanin resin) and a second polyfunctional monomer (for example a polyisocyanate) is added in the oil phase in step 2).

 According to an embodiment, a first polyfunctional monomer is added in the oil phase in step 1) and a second polyfunctional monomer is added in the emulsion in step 3).

10 According to a particular embodiment, the process of the invention comprises the step of adding a polymeric emulsifier in step 1) in the water phase.

 By “polymeric emulsifier”, it meant an emulsifier having both a polar group with an affinity for water (hydrophilic) and a nonpolar group with an affinity for oil (lipophilic). The hydrophilic part will dissolve in the water phase and the hydrophobic part will dissolve in the oil
15 phase providing a film around droplets. Regenerated biopolymer used in the present invention are not a polymeric emulsifier. Regenerated biopolymer belongs to colloidal stabilizer.

 This optional polymeric emulsifier can allow assisting to stabilize the oil droplets in the presence of regenerated biopolymer. This embodiment can be particularly suitable when regenerated biopolymer concentration is low. The polymeric emulsifier can be an ionic or non-
20 ionic surfactant. As non-limiting examples, non-ionic polymers include polyvinyl alcohol, cellulose derivatives such hydroxyethyl cellulose, polyethylene oxide, co-polymers of polyethylene oxide and polyethylene or polypropylene oxide, co-polymers alkyl acrylates and N-vinylpyrrolidone, and non-ionic polysaccharide. Ionic polymers include co-polymers of acrylamide and acrylic acid, acid anionic surfactant (such as sodium dodecyl sulfate), acrylic co-polymers
25 bearing a sulfonate group, and co-polymers of vinyl ethers and maleic anhydride, and ionic polysaccharide.

 According to an embodiment, during the process, no polymeric emulsifier is added at any stage of the process.

 According to a particular embodiment, the process of the invention comprises the step of
30 adding a colloidal stabilizer or colloidal particle stabilizer (in addition to the regenerated biopolymer), in step 1), in the water phase.

According to a particular embodiment, the process of the invention comprises the step of adding a reactant in step 1) and/or step 3). This optional reactant can participate to the shell formation of microcapsules. The reactant can be water soluble or water suspensible. Examples of suitable reactant include alcohols, amines, phenols, thiols, (meth)acrylates, epoxides, anhydrides
5 with two or more functionalities, polyalkoxysilane, melamine-formaldehyde resin and melamine-glyoxal resin, and mixtures thereof.

The reactant is usually added in an amount comprised between 0.01% and 10%, preferably 0.01% and 5%, based on the total weight of the water phase.

When a reactant is added, the reactant can also react with the polyfunctional monomer for
10 polymeric shell formation. According to this embodiment, in addition to the reactant, the regenerated biopolymer particles can also participate to the polymeric shell formation.

According to an embodiment, during the process, no reactant is added at any stage of the process.

In the first step of the process, the regenerated biopolymer is dispersed in an aqueous phase.
15 Typically, this is done using high mechanical agitation.

Said regenerated biopolymer suspension may be obtained by the method described previously.

According to an embodiment, the total amount of regenerated biopolymer present in water phase is comprised between 0.01 and 10 wt%, preferably between 0.01 and 5 wt% based on the
20 total weight of the water phase.

According to an embodiment, in a second step, at least one oil soluble polyfunctional monomer is dissolved in a hydrophobic material (for example, a perfume or flavour oil) to form an oil phase, which is then added to the water phase to form a Pickering emulsion, the mean droplet size of which is comprised between 1 and 3000 microns, preferably between 1 and 500 microns,
25 more preferably between 5 and 50 microns. The oil-in-water Pickering emulsion is made for instance by using high speed mechanical disperser or ultrasonic dispersers at room temperature.

According to an embodiment, the Pickering emulsion formation takes place at room temperature. By "room temperature", it is meant typically a temperature comprised between 20 and 25°C. According to another embodiment, the Pickering emulsion formation takes place at a
30 temperature below room temperature.

According to an embodiment, the Pickering emulsion formation takes place at a temperature below 25°C, preferably below 10°C, more preferably between 0°C and 10°C so as to reduce the reactivity of polyfunctional monomer in oil phase to avoid the reaction between polyfunctional monomer with regenerated biopolymer or/and water during emulsification process.

5 Once the Pickering emulsion is formed, the pH value is preferably maintained at 5-6, or adjusted to a value above 6.5, or adjusted to a value above 8.5 and preferably not higher than 11. However, this step can be omitted.

According to an embodiment, the oil phase represents between 5 and 60%, preferably between 20 and 40% by weight of the Pickering emulsion.

10 Then, the interfacial polymerization and/or interfacial reaction can be carried out typically at a temperature between 25°C and 90°C, preferably between 50°C and 80°C under stirring for 2 to 40 hours to complete the reaction and form hybrid microcapsules in the form of a slurry. However, the heating step can be omitted.

According to a particular embodiment, the monomer added in step 2) is at least one
15 polyisocyanate having at least two isocyanate functional groups.

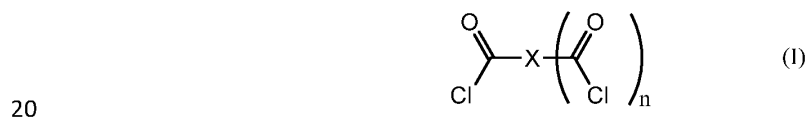
Suitable polyisocyanates used according to the invention include aromatic polyisocyanate, aliphatic polyisocyanate and mixtures thereof. Said polyisocyanate comprises at least 2, preferably at least 3 but may comprise up to 6, or even only 4, isocyanate functional groups. According to a particular embodiment, a diisocyanate (2 isocyanate functional group) or a triisocyanate (3
20 isocyanate functional group) or mixtures thereof is used.

According to one embodiment, said polyisocyanate is an aromatic polyisocyanate. The term “aromatic polyisocyanate” is meant here as encompassing any polyisocyanate comprising an aromatic moiety. Preferably, it comprises a phenyl, a toluy, a xylyl, a naphthyl or a diphenyl moiety, more preferably a toluy or a xylyl moiety. Preferred aromatic
25 polyisocyanates are biurets, polyisocyanurates and trimethylol propane adducts of diisocyanates, more preferably comprising one of the above-cited specific aromatic moieties. More preferably, the aromatic polyisocyanate is a polyisocyanurate of toluene diisocyanate (commercially available from Bayer under the tradename Desmodur® RC), a trimethylol propane-adduct of toluene diisocyanate (commercially available from Bayer under the tradename Desmodur® L75),
30 a trimethylol propane-adduct of xylylene diisocyanate (commercially available from Mitsui Chemicals under the tradename Takenate® D-110N).

According to another embodiment, said polyisocyanate is an aliphatic polyisocyanate. The term “aliphatic polyisocyanate” is defined as a polyisocyanate which does not comprise any aromatic moiety. Preferred aliphatic polyisocyanates are a trimer of hexamethylene diisocyanate, a trimer of isophorone diisocyanate, a trimethylol propane-adduct of hexamethylene diisocyanate (available from Mitsui Chemicals), a biuret of hexamethylene diisocyanate (commercially available from Bayer under the tradename Desmodur® N 100).

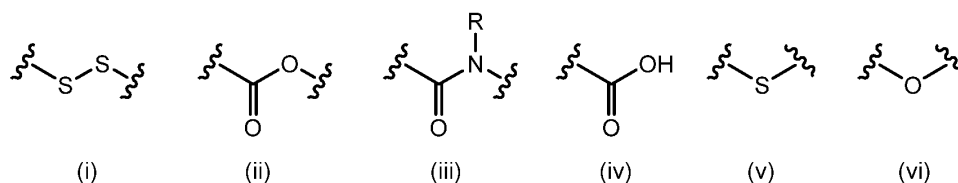
According to another embodiment, the polyisocyanate is in the form of a mixture of at least one aliphatic polyisocyanate and of at least one aromatic polyisocyanate, both comprising at least two or three isocyanate functional groups, such as a mixture of a biuret of hexamethylene diisocyanate with a trimethylol propane-adduct of xylylene diisocyanate, a mixture of a biuret of hexamethylene diisocyanate with a polyisocyanurate of toluene diisocyanate, and a mixture of a biuret of hexamethylene diisocyanate with a trimethylol propane-adduct of toluene diisocyanate. Most preferably, it is a mixture of a biuret of hexamethylene diisocyanate with a trimethylol propane-adduct of xylylene diisocyanate. Preferably, when used as a mixture the molar ratio between the aliphatic polyisocyanate and the aromatic polyisocyanate is ranging from 90:10 to 10:90.

According to an embodiment, the polyfunctional monomer is an acyl chloride. According to a particular embodiment, the acyl chloride has the following formula (I)



wherein n is an integer varying between 1 and 8, preferably between 1 and 6, more preferably between 1 and 4, and

wherein X is an (n+1)-valent C₂ to C₄₅ hydrocarbon group optionally comprising at least one group selected from (i) to (vi),



wherein R is a hydrogen atom or a methyl or ethyl group, preferably a hydrogen atom.

5 It is understood that by "... **hydrocarbon group** ..." it is meant that said group consists of hydrogen and carbon atoms and can be in the form of an aliphatic hydrocarbon, i.e. linear or branched saturated hydrocarbon (e.g. alkyl group), a linear or branched unsaturated hydrocarbon (e.g. alkenyl or alkynyl group), a saturated cyclic hydrocarbon (e.g. cycloalkyl) or an unsaturated cyclic hydrocarbon (e.g. cycloalkenyl or cycloalkynyl), or can be in the form of an aromatic hydrocarbon, i.e. aryl group, or can also be in the form of a mixture of said type of groups, e.g. a specific group may comprise a linear alkyl, a branched alkenyl (e.g. having one or more carbon-carbon double bonds), a (poly)cycloalkyl and an aryl moiety, unless a specific limitation to only one type is mentioned. Similarly, in all the embodiments of the invention, when a group is mentioned as being in the form of more than one type of topology (e.g. linear, cyclic or branched) and/or being saturated or unsaturated (e.g. alkyl, aromatic or alkenyl), it is also meant a group which may comprise moieties having any one of said topologies or being saturated or unsaturated, as explained above. Similarly, in all the embodiments of the invention, when a group is mentioned as being in the form of one type of saturation or unsaturation, (e.g. alkyl), it is meant that said group can be in any type of topology (e.g. linear, cyclic or branched) or having several moieties with various topologies.

20 It is understood that with the term "... **a hydrocarbon group, optionally comprising** ..." it is meant that said hydrocarbon group optionally comprises heteroatoms to form ether, thioether, amine, nitrile or carboxylic acid groups. These groups can either substitute a hydrogen atom of the hydrocarbon group and thus be laterally attached to said hydrocarbon, or substitute a carbon atom (if chemically possible) of the hydrocarbon group and thus be inserted into the hydrocarbon chain or ring.

According to a particular embodiment, the acyl chloride is chosen from the group consisting of benzene-1,3,5-tricarbonyl trichloride (trimesoyl trichloride), benzene-1,2,4-

tricarboxyl trichloride, benzene-1,2,4,5-tetracarboxyl tetrachloride, cyclohexane-1,3,5-tricarboxyl trichloride, isophthaloyl dichloride, diglycolyl dichloride, terephthaloyl chloride, fumaryl dichloride, adipoyl dichloride, succinyl chloride, propane-1,2,3-tricarboxyl trichloride, cyclohexane-1,2,4,5-tetracarboxyl tetrachloride, 2,2'-disulfanediylsuccinyl dichloride, 2-(2-chloro-2-oxo-ethyl)sulfanylbutanedioyl dichloride, (4-chloro-4-oxobutanoyl)-L-glutamoyl dichloride, (S)-4-((1,5-dichloro-1,5-dioxopentan-2-yl)amino)-4-oxobutanoic acid, 2,2-bis[(4-chloro-4-oxo-butanoyl)oxymethyl]butyl 4-chloro-4-oxo-butanoate, [2-[2,2-bis[(4-chloro-4-oxo-butanoyl)oxymethyl]butoxymethyl]-2-[(4-chloro-4-oxo-butanoyl)oxymethyl]butyl] 4-chloro-4-oxo-butanoate, 2,2-bis[(2-chlorocarbonylbenzoyl)oxymethyl]butyl 2-chlorocarbonyl-benzoate, [2-[2,2-bis[(2-chlorocarbonylbenzoyl)oxymethyl]butoxymethyl]-2-[(2-chlorocarbonylbenzoyl)oxymethyl]butyl] 2-chlorocarbonylbenzoate, 4-(2,4,5-trichlorocarbonylbenzoyl)oxybutyl 2,4,5-trichlorocarbonyl-benzoate, propane-1,2,3-triyl tris(4-chloro-4-oxobutanoate), propane-1,2-diyl bis(4-chloro-4-oxobutanoate) and mixtures thereof.

According to a particular embodiment, the acyl chloride is chosen from the group consisting of benzene-1,2,4-tricarboxyl trichloride, benzene-1,2,4,5-tetracarboxyl tetrachloride, cyclohexane-1,3,5-tricarboxyl trichloride, isophthaloyl dichloride, diglycolyl dichloride, terephthaloyl chloride, fumaryl dichloride, adipoyl dichloride, succinic dichloride, propane-1,2,3-tricarboxyl trichloride, cyclohexane-1,2,4,5-tetracarboxyl tetrachloride, 2,2'-disulfanediylsuccinyl dichloride, 2-(2-chloro-2-oxo-ethyl)sulfanylbutanedioyl dichloride, (4-chloro-4-oxobutanoyl)-L-glutamoyl dichloride, (S)-4-((1,5-dichloro-1,5-dioxopentan-2-yl)amino)-4-oxobutanoic acid, 2,2-bis[(4-chloro-4-oxo-butanoyl)oxymethyl]butyl 4-chloro-4-oxo-butanoate, [2-[2,2-bis[(4-chloro-4-oxo-butanoyl)oxymethyl]butoxymethyl]-2-[(4-chloro-4-oxo-butanoyl)oxymethyl]butyl] 4-chloro-4-oxo-butanoate, 2,2-bis[(2-chlorocarbonylbenzoyl)oxymethyl]butyl 2-chlorocarbonyl-benzoate, [2-[2,2-bis[(2-chlorocarbonylbenzoyl)oxymethyl]butoxymethyl]-2-[(2-chlorocarbonylbenzoyl)oxymethyl]butyl] 2-chlorocarbonylbenzoate, 4-(2,4,5-trichlorocarbonylbenzoyl)oxybutyl 2,4,5-trichlorocarbonyl-benzoate, propane-1,2,3-triyl tris(4-chloro-4-oxobutanoate), propane-1,2-diyl bis(4-chloro-4-oxobutanoate), and mixtures thereof.

According to a particular embodiment, the acyl chloride is chosen from the group consisting of fumaryl dichloride, adipoyl dichloride, succinic dichloride, propane-1,2,3-triyl tris(4-chloro-4-oxobutanoate), propane-1,2-diyl bis(4-chloro-4-oxobutanoate), and mixtures thereof.

According to an embodiment, the polyfunctional monomer used in the process of the invention is present in amounts representing from 0.1 and 30%, preferably from 0.2 and 20% by weight based on the total amount of the oil phase.

5 Optional step: optional outer coating

According to a particular embodiment of the invention, at the end of step 3) or during step 3), one may also add to the invention's slurry a polymer selected from the group consisting of a non-ionic polysaccharide, a cationic polymer, a polysuccinimide derivative and mixtures thereof as defined previously to form an outer coating to the microcapsule.

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PROCESS FOR PREPARING MICROCAPSULE POWDER

Another object of the invention is a process for preparing a microcapsule powder comprising the steps as defined above and an additional step consisting of submitting the slurry obtained in step 3) to a drying process, like spray-drying, to provide the microcapsules as such, i.e. in a powdery form. It is understood that any standard method known by a person skilled in the art to perform such drying is also applicable. In particular the slurry may be spray-dried preferably in the presence of a polymeric carrier material such as polyvinyl acetate, polyvinyl alcohol, dextrins, natural or modified starch, vegetable gums, pectins, xanthans, alginates, carragenans or cellulose derivatives to provide microcapsules in a powder form.

20 However, one may cite also other drying method such as the extrusion, plating, spray granulation, the fluidized bed, or even a drying at room temperature using materials (carrier, desiccant) that meet specific criteria as disclosed in WO2017/134179.

According to a particular embodiment, the carrier material contains free perfume oil which can be the same or different from the perfume from the core of the microcapsules.

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CORE-SHELL MICROCAPSULE

Another object of the invention is a microcapsule or a microcapsule slurry obtainable by the process as described above.

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MULTIPLE CAPSULE SYSTEM

According to an embodiment, the microcapsules of the invention (first type of microcapsule) can be used in combination with a second type of microcapsules.

Another object of the invention is a microcapsule delivery system comprising:

- 5 - the microcapsules of the present invention as a first type of microcapsules, and
- a second type of microcapsules, wherein the first type of microcapsules and the second type of microcapsules differ in their hydrophobic material and/or their regenerated biopolymer and/or their wall material and/or in their coating material.

10 PERFUMING COMPOSITION AND CONSUMER PRODUCTS

The microcapsules of the invention can be used in combination with active ingredients. An object of the invention is therefore a composition comprising:

- (i) microcapsules or microcapsule slurry as defined above;
- (ii) an active ingredient, preferably chosen in the group consisting of a cosmetic ingredient,
- 15 skin caring ingredient, perfume ingredient, flavor ingredient, malodour counteracting ingredient, bactericide ingredient, fungicide ingredient, pharmaceutical or agrochemical ingredient, a sanitizing ingredient, an insect repellent or attractant, and mixtures thereof.

The microcapsules of the invention show a good performance in terms of stability in challenging
20 medium.

Another object of the present invention is a perfuming composition comprising:

- (i) microcapsules or microcapsule slurry as defined above, wherein the oil comprises a perfume;
- (ii) at least one ingredient selected from the group consisting of a perfumery carrier, a
- 25 perfumery co-ingredient and mixtures thereof;
- (iii) optionally at least one perfumery adjuvant.

As liquid perfumery carrier one may cite, as non-limiting examples, an emulsifying system, i.e. a solvent and a surfactant system, or a solvent commonly used in perfumery. A detailed description of the nature and type of solvents commonly used in perfumery cannot be exhaustive. However,

30 one can cite as non-limiting examples solvents such as dipropyleneglycol, diethyl phthalate, isopropyl myristate, benzyl benzoate, 2-(2-ethoxyethoxy)-1-ethanol or ethyl citrate, which are the

most commonly used. For the compositions which comprise both a perfumery carrier and a perfumery co-ingredient, other suitable perfumery carriers than those previously specified, can be also ethanol, water/ethanol mixtures, limonene or other terpenes, isoparaffins such as those known under the trademark Isopar® (origin: Exxon Chemical) or glycol ethers and glycol ether esters such as those known under the trademark Dowanol® (origin: Dow Chemical Company). By “perfumery co-ingredient” it is meant here a compound, which is used in a perfuming preparation or a composition to impart a hedonic effect and which is not a microcapsule as defined above. In other words such a co-ingredient, to be considered as being a perfuming one, must be recognized by a person skilled in the art as being able to at least impart or modify in a positive or pleasant way the odor of a composition, and not just as having an odor.

The nature and type of the perfuming co-ingredients present in the perfuming composition do not warrant a more detailed description here, which in any case would not be exhaustive, the skilled person being able to select them on the basis of his general knowledge and according to the intended use or application and the desired organoleptic effect. In general terms, these perfuming co-ingredients belong to chemical classes as varied as alcohols, lactones, aldehydes, ketones, esters, ethers, acetates, nitriles, terpenoids, nitrogenous or sulphurous heterocyclic compounds and essential oils, and said perfuming co-ingredients can be of natural or synthetic origin. Many of these co-ingredients are in any case listed in reference texts such as the book by S. Arctander, *Perfume and Flavor Chemicals*, 1969, Montclair, New Jersey, USA, or its more recent versions, or in other works of a similar nature, as well as in the abundant patent literature in the field of perfumery. It is also understood that said co-ingredients may also be compounds known to release in a controlled manner various types of perfuming compounds also known as properfume or profragrance. Non-limiting examples of suitable properfumes may include 4-(dodecylthio)-4-(2,6,6-trimethyl-2-cyclohexen-1-yl)-2-butanone, 4-(dodecylthio)-4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-2-butanone, trans-3-(dodecylthio)-1-(2,6,6-trimethyl-3-cyclohexen-1-yl)-1-butanone, 2-(dodecylthio)octan-4-one, 2-phenylethyl oxo(phenyl)acetate, 3,7-dimethylocta-2,6-dien-1-yl oxo(phenyl)acetate, (Z)-hex-3-en-1-yl oxo(phenyl)acetate, 3,7-dimethyl-2,6-octadien-1-yl hexadecanoate, bis(3,7-dimethylocta-2,6-dien-1-yl) succinate, (2-((2-methylundec-1-en-1-yl)oxy)ethyl)benzene, 1-methoxy-4-(3-methyl-4-phenethoxybut-3-en-1-yl)benzene, (3-methyl-4-phenethoxybut-3-en-1-yl)benzene, 1-(((Z)-hex-3-en-1-yl)oxy)-2-methylundec-1-ene, (2-((2-methylundec-1-en-1-yl)oxy)ethoxy)benzene, 2-methyl-1-(octan-3-yloxy)undec-1-ene, 1-

methoxy-4-(1-phenethoxyprop-1-en-2-yl)benzene, 1-methyl-4-(1-phenethoxyprop-1-en-2-yl)benzene, 2-(1-phenethoxyprop-1-en-2-yl)naphthalene, (2-phenethoxyvinyl)benzene, 2-(1-((3,7-dimethyloct-6-en-1-yl)oxy)prop-1-en-2-yl)naphthalene, (2-((2-pentylcyclopentylidene)methoxy)ethyl)benzene, 4-allyl-2-methoxy-1-((2-methoxy-2-phenylvinyl)oxy)benzene, (2-((2-heptylcyclopentylidene)methoxy)ethyl)benzene, 1-isopropyl-4-methyl-2-((2-pentylcyclopentylidene)methoxy)benzene, 2-methoxy-1-((2-pentylcyclopentylidene)methoxy)-4-propylbenzene, 3-methoxy-4-((2-methoxy-2-phenylvinyl)oxy)benzaldehyde, 4-((2-(hexyloxy)-2-phenylvinyl)oxy)-3-methoxybenzaldehyde or a mixture thereof.

By “perfumery adjuvant” we mean here an ingredient capable of imparting additional added benefit such as a color, a particular light resistance, chemical stability, etc. A detailed description of the nature and type of adjuvant commonly used in perfuming bases cannot be exhaustive, but it has to be mentioned that said ingredients are well known to a person skilled in the art.

Preferably, the perfuming composition according to the invention comprises between 0.01 and 30 % by weight of microcapsules as defined above.

The invention’s microcapsules can advantageously be used in many application fields and used in consumer products. Microcapsules can be used in liquid form applicable to liquid consumer products as well as in powder form, applicable to powder consumer products.

According to a particular embodiment, the consumer product as defined above is liquid and comprises:

- a) from 2 to 65% by weight, relative to the total weight of the consumer product, of at least one surfactant;
- b) water or a water-miscible hydrophilic organic solvent; and
- c) a microcapsule slurry as defined above,
- d) optionally non-encapsulated perfume.

According to a particular embodiment, the consumer product as defined above is in a powder form and comprises:

- a) from 2 to 65% by weight, relative to the total weight of the consumer product, of at least one surfactant;
- b) a microcapsule powder as defined above.

c) optionally perfume powder that is different from the microcapsules defined above.

In the case of microcapsules including a perfume oil-based core, the products of the invention, can in particular be of used in perfumed consumer products such as product belonging to fine fragrance or “functional” perfumery. Functional perfumery includes in particular personal-care products including hair-care, body cleansing, skin care, hygiene-care as well as home-care products including laundry care, surface care and air care. Consequently, another object of the present invention consists of a perfumed consumer product comprising as a perfuming ingredient, the microcapsules defined above or a perfuming composition as defined above. The perfume element of said consumer product can be a combination of perfume microcapsules as defined above and free or non-encapsulated perfume, as well as other types of perfume microcapsules than those here-disclosed.

In particular a liquid consumer product comprising:

- a) from 2 to 65% by weight, relative to the total weight of the consumer product, of at least one surfactant;
- b) water or a water-miscible hydrophilic organic solvent; and
- c) a perfuming composition as defined above is another object of the invention.

Also a powder consumer product comprising

- (a) from 2 to 65% by weight, relative to the total weight of the consumer product, of at least one surfactant; and
- (b) a perfuming composition as defined above is part of the invention.

The invention’s microcapsules can therefore be added as such or as part of an invention’s perfuming composition in a perfumed consumer product.

For the sake of clarity, it has to be mentioned that, by “perfumed consumer product” it is meant a consumer product which is expected to deliver among different benefits a perfuming effect to the surface to which it is applied (e.g. skin, hair, textile, paper, or home surface) or in the air (air-freshener, deodorizer etc.). In other words, a perfumed consumer product according to the invention is a manufactured product which comprises a functional formulation also referred to as “base”, together with benefit agents, among which an effective amount of microcapsules according to the invention.

The nature and type of the other constituents of the perfumed consumer product do not warrant a more detailed description here, which in any case would not be exhaustive, the skilled

person being able to select them on the basis of his general knowledge and according to the nature and the desired effect of said product. Base formulations of consumer products in which the microcapsules of the invention can be incorporated can be found in the abundant literature relative to such products. These formulations do not warrant a detailed description here which would in any case not be exhaustive. The person skilled in the art of formulating such consumer products is perfectly able to select the suitable components on the basis of his general knowledge and of the available literature.

Non-limiting examples of suitable perfumed consumer products can be a perfume, such as a fine perfume, a cologne, an after-shave lotion, a body-splash; a fabric care product, such as a liquid or solid detergent, tablets and unit dose (single or multi chambers), a fabric softener, a dryer sheet, a fabric refresher, an ironing water, or a bleach; a personal-care product, such as a hair-care product (e.g. a shampoo, hair conditioner, a coloring preparation or a hair spray), a cosmetic preparation (e.g. a vanishing cream, body lotion or a deodorant or antiperspirant), or a skin-care product (e.g. a perfumed soap, shower or bath mousse, body wash, oil or gel, bath salts, or a hygiene product); an air care product, such as an air freshener or a “ready to use” powdered air freshener; or a home care product, such all-purpose cleaners, liquid or power or tablet dishwashing products, toilet cleaners or products for cleaning various surfaces, for example sprays & wipes intended for the treatment / refreshment of textiles or hard surfaces (floors, tiles, stone-floors etc.); a hygiene product such as sanitary napkins, diapers, toilet paper.

Another object of the invention is a consumer product comprising:

- a personal care active base, and
- microcapsules or microcapsule slurry as defined above or the perfuming composition as defined above,

wherein the consumer product is in the form of a personal care composition.

Personal care active bases in which the microcapsules of the invention can be incorporated can be found in the abundant literature relative to such products. These formulations do not warrant a detailed description here which would in any case not be exhaustive. The person skilled in the art of formulating such consumer products is perfectly able to select the suitable components on the basis of his general knowledge and of the available literature.

The personal care composition is preferably chosen in the group consisting of a hair-care product (e.g. a shampoo, hair conditioner, a coloring preparation or a hair spray), a cosmetic preparation

(e.g. a vanishing cream, body lotion or a deodorant or antiperspirant), or a skin-care product (e.g. a perfumed soap, shower or bath mousse, body wash, oil or gel, bath salts, or a hygiene product);

Another object of the invention is a consumer product comprising:

- a home care or a fabric care active base, and
- 5- microcapsules microcapsule slurry as defined above or the perfuming composition as defined above,

wherein the consumer product is in the form of a home care or a fabric care composition.

Home care or fabric care active bases in which the microcapsules of the invention can be incorporated can be found in the abundant literature relative to such products. These formulations
10 do not warrant a detailed description here which would in any case not be exhaustive. The person skilled in the art of formulating such consumer products is perfectly able to select the suitable components on the basis of his general knowledge and of the available literature.

Preferably, the consumer product comprises from 0.1 to 15 wt%, more preferably between 0.2 and 5 wt% of the microcapsules of the present invention, these percentages being defined by
15 weight relative to the total weight of the consumer product. Of course the above concentrations may be adapted according to the benefit effect desired in each product.

For liquid consumer product mentioned below, by “active base”, it should be understood that the active base includes active materials (typically including surfactants) and water.

For solid consumer product mention below, by “active base”, it should be understood that
20 the active base includes active materials (typically including surfactants) and auxiliary agents (such as bleaching agents, buffering agent; builders; soil release or soil suspension polymers; granulated enzyme particles, corrosion inhibitors, antifoaming, sud suppressing agents; dyes, fillers, and mixtures thereof).

25 **Fabric softener**

An object of the invention is a consumer product in the form of a fabric softener composition comprising:

- a fabric softener active base; preferably comprising at least one active material chosen in the group consisting of dialkyl quaternary ammonium salts, dialkyl ester quaternary
30 ammonium salts (esterquats), Hamburg esterquat (HEQ), TEAQ (triethanolamine quat),

- silicones and mixtures thereof, the active base being used preferably in an amount comprised between 85 and 99.95% by weight based on the total weight of the composition,
- microcapsules or a microcapsule slurry as defined above, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
 - optionally free perfume oil.

Liquid detergent

An object of the invention is a consumer product in the form of a liquid detergent composition comprising:

- a liquid detergent active base; preferably comprising at least one active material chosen in the group consisting of anionic surfactant such as alkylbenzenesulfonate (ABS), secondary alkyl sulfonate (SAS), primary alcohol sulfate (PAS), lauryl ether sulfate (LES), methyl ester sulfonate (MES) and nonionic surfactant such as alkyl amines, alkanolamide, fatty alcohol poly(ethylene glycol) ether, fatty alcohol ethoxylate (FAE), ethylene oxide (EO) and propylene oxide (PO) copolymers, amine oxydes, alkyl polyglucosides, alkyl polyglucosamides, the active base being used preferably in an amount comprised between 85 and 99.95% by weight based on the total weight of the composition,
- microcapsules or a microcapsule slurry as defined above, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
- optionally free perfume oil.

Solid detergent

An object of the invention is a consumer product in the form of a solid detergent composition comprising:

- a solid detergent active base; preferably comprising at least one active material chosen in the group consisting of anionic surfactant such as alkylbenzenesulfonate (ABS), secondary alkyl sulfonate (SAS), primary alcohol sulfate (PAS), lauryl ether sulfate (LES), methyl ester sulfonate (MES) and nonionic surfactant such as alkyl amines, alkanolamide, fatty alcohol poly(ethylene glycol) ether, fatty alcohol ethoxylate (FAE), ethylene oxide (EO)

and propylene oxide (PO) copolymers, amine oxydes, alkyl polyglucosides, alkyl polyglucosamides, the active base being used preferably in an amount comprised between 85 and 99.95% by weight based on the total weight of the composition,

- microcapsules or a microcapsule powder or microcapsule slurry as defined above, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
- optionally free perfume oil.

Shampoo/shower gel

10 An object of the invention is a consumer product in the form of a shampoo or a shower gel composition comprising:

- a shampoo or a shower gel active base; preferably comprising at least one active material chosen in the group consisting of sodium alkylether sulfate, ammonium alkylether sulfates, alkylamphoacetate, cocamidopropyl betaine, cocamide MEA, alkylglucosides and aminoacid based surfactants and mixtures thereof, the active base being used preferably in an amount comprised between 85 and 99.95% by weight based on the total weight of the composition,
- microcapsules or a microcapsule slurry as defined above, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
- optionally free perfume oil.

Rinse-Off Conditioner

25 An object of the invention is a consumer product in the form of a rinse-off conditioner composition comprising:

- a rinse-off conditioner active base; preferably comprising at least one active material chosen in the group consisting of cetyltrimonium chloride, stearyl trimonium chloride, benzalkonium chloride, behentrimonium chloride and mixture thereof, the active base being used preferably in an amount comprised between 85 and 99.95% by weight based on the total weight of the composition,

- microcapsules or a microcapsule slurry as defined above, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
- optionally free perfume oil.

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Solid scent booster

An object of the invention is a consumer product in the form of a solid scent booster composition comprising:

- a solid carrier, preferably chosen in the group consisting of urea, sodium chloride, sodium sulphate, sodium acetate, zeolite, sodium carbonate, sodium bicarbonate, clay, talc, calcium carbonate, magnesium sulfate, gypsum, calcium sulfate, magnesium oxide, zinc oxide, titanium dioxide, calcium chloride, potassium chloride, magnesium chloride, zinc chloride, saccharides such as sucrose, mono-, di-, and polysaccharides and derivatives such as starch, cellulose, methyl cellulose, ethyl cellulose, propyl cellulose, polyols/sugar alcohols such as sorbitol, maltitol, xylitol, erythritol, and isomalt, PEG, PVP, citric acid or any water soluble solid acid, fatty alcohols or fatty acids and mixtures thereof,
- microcapsules or a microcapsule slurry as defined above, in a powdered form, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
- optionally free perfume oil.

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Liquid scent booster

An object of the invention is a consumer product in the form of a liquid scent booster composition comprising:

- an aqueous phase,
- a surfactant system essentially consisting of one or more than one non-ionic surfactant, wherein the surfactant system has a mean HLB between 10 and 14, preferably chosen in the group consisting of ethoxylated aliphatic alcohols, POE/PPG (polyoxyethylene and polyoxypropylene) ethers, mono and polyglyceryl esters, sucrose ester compounds, polyoxyethylene hydroxylesters, alkyl polyglucosides, amine oxides and combinations thereof;

25

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- a linker chosen in the group consisting of alcohols, salts and esters of carboxylic acids, salts and esters of hydroxyl carboxylic acids, fatty acids, fatty acid salts, glycerol fatty acids, surfactant having an HLB less than 10 and mixtures thereof, and
- 5 - microcapsules or a microcapsule slurry as defined above, in the form of a slurry, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight based on the total weight of the composition,
- optionally free perfume oil.

10 **Hair coloration**

An object of the invention is a consumer product in the form of an oxidative hair coloring composition comprising:

- an oxidizing phase comprising an oxidizing agent and an alkaline phase comprising an alkakine agent, a dye precursor and a coupling compound; wherein said dye precursor and
- 15 said coupling compound form an oxidative hair dye in the presence of the oxidizing agent, preferably in an amount comprised between 85 and 99.95% by weight based on the total weight of the composition,
- microcapsules or a microcapsule slurry as defined above, preferably in an amount comprised between 0.05 to 15 wt%, more preferably between 0.1 and 5 wt% by weight
- 20 based on the total weight of the composition,
- optionally free perfume oil

Perfuming composition

According to a particular embodiment, the consumer product is in the form of a perfuming

25 composition comprising:

- 0.1 to 30%, preferably 0.1 to 20% of microcapsules or a microcapsule slurry as defined previously,
- 0 to 40%, preferably 3-40% of perfume, and
- 20-90%, preferably 40-90% of ethanol, by weight based on the total weight of the
- 30 perfuming composition.

The invention will now be further described by way of examples. It will be appreciated that the invention as claimed is not intended to be limited in any way by these examples.

5

EXAMPLES

Example 1

Regenerated biopolymer suspension preparation

10 Regenerated-chitin preparation

- i) 3.0 g Crude chitin powder (from shrimp shells) was wetted with 9.0 g deionized water and mixed with 150 mL 85% aqueous phosphoric acid at 4 °C for 12 h, until a homogeneous solution was formed.
- ii) 750 mL deionized water was added to the obtained chitin solution to obtain a milky dispersion. Then the residue acid in the solution was washed away under centrifugation.
- iii) The precipitated chitin was collected and then treated in a high-pressure homogenizer (APV 2000; SPX Flow Technology, Germany) at 100 bar. The concentration of R-chitin in the final dispersion was ca.1.2 wt%.

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Regenerated-cellulose preparation

- i) 3.0 g wood pulp was wetted with 12.0 g deionized water and mixed with 480 mL 85% aqueous phosphoric acid under stirring at 5 °C for 24 h, until a homogeneous solution was formed.
- ii) 2 L deionized water was added to the obtained cellulose solution to induce the precipitation of cellulose. Then the residue acid in the solution was washed away under centrifugation.
- iii) The precipitated cellulose was collected and then treated in a high-pressure homogenizer (APV 2000; SPX Flow Technology, Germany) at 800 bar. The concentration of R-cellulose in the final dispersion was ca.1.1 wt%.

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Regenerated-corn stalk preparation

- i) The corn stalk was smashed to powder by a pulverizer, 10.0 g corn stalk powder was mixed with 150 mL phosphoric acid under stirring at 30 °C until a homogeneous solution was formed.
- 5 ii) 1.5 L deionized water was added to the obtained solution to induce the precipitation of regenerated corn stalk. Then the residue acid in the solution was washed away under centrifugation.
- 10 iii) The precipitated corn stalk was homogenized at 10000 rpm for 3 min (2 times) with ultra-turrax by adding 400 mL water, followed homogenized with high-pressure homogenizer (APV 2000; SPX Flow Technology, Germany) at 200 bar for three times and then 800 bar for 5 times. The concentration of R-corn stalk in the final dispersion was 0.8 wt%.

Regenerated-bagasse preparation

- 15 i) The bagasse was smashed to powder by a pulverizer, 10.0 g bagasse powder was mixed with 150 mL phosphoric acid under stirring at 30 °C until a homogeneous solution was formed.
- ii) 1.5 L deionized water was added to the obtained solution to induce the precipitation of regenerated bagasse. Then the residue acid in the solution was washed away under centrifugation.
- 20 iii) The precipitated bagasse was homogenized at 10000 rpm for 3 min (2 times) with ultra-turrax by adding 400 mL water, followed homogenized with high-pressure homogenizer (APV 2000; SPX Flow Technology, Germany) at 200 bar for three times and then 800 bar for 5 times. The concentration of R-bagasse in the final dispersion was 0.8 wt%.
- 25

Regenerated-silk fibroin preparation

- i) Dry extracted silks (Cocoon silks treated in boiling Na₂CO₃ solution) were dissolved in 85 wt% phosphoric acid while stirring continuously at room temperature for 30 min, yielding a 4 wt% solution.
- 30

- ii) Subsequently, acetone was added into the acidic solution with continued stirring. An appropriate amount of deionized water was added, and acetone and phosphoric acid were removed under centrifugation until the solution becomes neutral.
- 5 iii) The precipitated silk fibroin was homogenized with high-pressure homogenizer (APV 2000; SPX Flow Technology, Germany) at 800 bar for 3 times. The concentration of R-silk fibroin in the final dispersion was 1.2 wt%.

Example 2

10 Microcapsule preparation with regenerated biopolymer as colloidal stabilizer

- i) The obtained regenerated biopolymer suspension was diluted with deionized water to appropriate solid content as water phase. The fragrance oil formulation with optionally solvent as oil phase is prepared. A polyfunctional monomer was optionally added in the oil phase or the water phase. The weight ratio of oil/water was controlled at 3/7.
- 15 ii) Stable Pickering emulsion was formed by mixing oil phase and water phase at low temperature (<10°C) with a homogenizer.
- 20 iii) The Pickering emulsion was transferred into a reactor. Optionally, a functional monomer was added into the Pickering emulsion and the interfacial reaction was carried out at 80°C for 3h with or without additional water-soluble reactant.

The formula of microcapsule samples are shown in Table 1.

25 Table 1: Microcapsule composition

Ex.	Biopolymer	Perfume oil ^{a)}	Polyfunctional monomer	Reactant in water	Solvent
A	0.52% R*-Chitin	29.1%	0.7% Takenate® ¹⁾ (added in the oil phase)	/	/
B	0.42% R-Silk Fibroin	13.9%	1.2% Benzenetricarbonyl	0.6% Ethylenediamine +	Benzyle Benzoate

			trichloride ²⁾ (added in the oil phase)	1.1% Diethylenetriamine	
C	0.31% R-Chitin	12.7%	1.1% Benzenetricarbonyl trichloride ²⁾ (added in the oil phase)	0.5% Ethylenediamine + 0.9% Diethylenetriamine	Benzyle Benzoate
D	0.35% R-Bagasse	12.2%	1.1% Benzenetricarbonyl trichloride ²⁾ (added in the oil phase)	0.5% Ethylenediamine + 0.9% Diethylenetriamine	Benzyle Benzoate
E	0.50% R-Bagasse	26.5%	0.45% Takenate® ¹⁾ (added in the oil phase) + 3.5% Melamine-glyoxal resin ³⁾ (added in the water phase)	0.58% 3,5-Diamino-1,2,4-Triazole	/
F	0.50% R-Silk Fibroin	29.3%	0.45% Takenate® ¹⁾ (added in the oil phase) + 1.2% Melamine-formaldehyde resin ⁴⁾ (added in the emulsion)	/	/
G	0.50% R-Silk Fibroin	29.5%	1.5% Melamine-formaldehyde resin ⁴⁾ (added in the emulsion)	/	/
H	0.50% R-Chitin	26.6%	2.2% Ethylene glycol dimethacrylate ⁵⁾ (added in the oil phase)	/	/

a) See Table 2

*regenerated

1) trimethylol propane adduct of xylylene diisocyanate; origin: Mitsui Chemicals, 75% polyisocyanate /25% ethyl acetate

5 2) benzene-1,3,5-tricarbonyl chloride; origin: Aldrich, Switzerland

3) reaction of Melamine, Glyoxal and 2,2-Dimethoxyacetaldehyde

4) reaction of Melamine and Formaldehyde

5) ethylene glycol dimethacrylate; origin: Aldrich, Switzerland

10 Table 2 - Formulation of the perfume oil

Ingredients	% in oil
Ethyl 2-methyl-pentanoate	3.20%
Eucalyptol	7.80%
2,4-Dimethyl-3-cyclohexene-1-carbaldehyde	0.75%
Aldehyde C ₁₀	0.75%
Citronellyl Nitrile	4.30%
Isobornyl acetate	3.00%
2-tert-butyl-1-cyclohexyl acetate	9.80%
Citronellyl Acetate	1.30%
2-Methylundecanal	3.00%
Diphenyloxide	0.80%
Aldehyde C ₁₂	1.30%
Dicyclopentadiene acetate	9.85%
Ionone beta	3.30%
Undecalactone gamma	18.75%
Hexyl Salicylate	15.90%
Benzyl Salicylate	16.20%

Example 3Characterization of the microcapsules

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Size measurement: Mean size (D [4,3]) of microcapsule slurry was measured by using the Mastersizer 3000 equipment from Malvern Instruments Ltd., UK

Zeta potential measurement: Zeta potential of microcapsules was examined using Zetasizer
10 Nano ZS from Malvern Instruments Ltd., UK

Oil permeability: The permeability of encapsulated fragrance oil in microcapsule was monitored by a Thermogravimetric Analyzer (TGA/DSC 1, Mettler-Toledo) equipped with a microbalance having an accuracy of 1 µg. The weight loss of encapsulated fragrance oil was
15 monitored at 50°C for 4hrs.

Table 3: Characterization of the microcapsules

Example	Mean size	Zeta potential	Ratio of leaked fragrance oil/encapsulated fragrance oil under TGA test
A	13.5 µm	-12.3 ± 1.2 mV	8.94%
B	30.6 µm	-33.1 ± 2.4 mV	2.51%
C	80.4 µm	-18.0 ± 3.1 mV	1.80%
D	30.7 µm	-17.3 ± 3.0 mV	4.17%
E	31.5 µm	-19.0 ± 0.47 mV	3.45%
F	49.5 µm	15.6 ± 2.4 mV	3.23%
G	47.6 µm	30.5 ± 2.1 mV	9.24%
H	20.6 µm	-12.2 ± 0.6 mV	4.38%

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Example 4Fabric softener composition

Microcapsules A-H of the present invention are dispersed in a liquid detergent base described in
 5 Table 4 to obtain a concentration of encapsulated perfume oil at 0.22%.

Table 4: Fabric Conditioner composition

Product	Wt %
Stepantex VL 90A	8.88
Calcium Chloride Sol. 10%	0.36
Proxel GXL	0.04
Perfume	1
Water	89.72
TOTAL	100

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Example 5Liquid detergent composition

Microcapsules A-H of the present invention are dispersed in a liquid detergent base described in
 15 Table 5 to obtain a concentration of encapsulated perfume oil at 0.22%.

Table 5 – Liquid detergent composition

Ingredients	Concentration [wt%]
Sodium C14-17 Alkyl Sec Sulfonate ¹⁾	7
Fatty acids, C12-18 and C18-unsaturated ²⁾	7.5
C12/14 fatty alcohol polyglycol ether with 7 mol EO ³⁾	17
Triethanolamine	7.5

Propylene Glycol	11
Citric acid	6.5
Potassium Hydroxyde	9.5
Protease	0.2
Amylase	0.2
Mannanase	0.2
Acrylates/Steareth-20 Methacrylate structuring Crosspolymer ⁴⁾	6
Deionized Water	27.4

1) Hostapur SAS 60; Origin: Clariant

2) Edenor K 12-18; Origin: Cognis

3) Genapol LA 070; Origin: Clariant

4) Aculyn 88; Origin: Dow Chemical

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Example 6

Rinse-off conditioner

- 10 Microcapsules A-H of the present invention are dispersed in a rinse-off conditioner base described in table 6 to obtain a concentration of encapsulated perfume oil at 0.5%.

Table 6 – Rinse-off conditioner composition

	Ingredients	Concentration [wt %]
A	Water deionized	81.8
	Behentrimonium Chloride ¹⁾	2.5
	Hydroxyethylcellulose ²⁾	1.5
B	Cetearyl Alcohol ³⁾	4

	Glyceryl Stearate (and) PEG-100 Stearate ⁴⁾	2
	Behentrimonium Methosulfate (and) Cetyl alcohol (and) Butylene Glycol ⁵⁾	4
	Ethoxy (20) Stearyl Alcohol ⁶⁾	1
C	Amodimethicone (and) Trideceth-12 (and) Cetrimonium Chloride ⁷⁾	3
	Chlorhexidine Digluconate ⁸⁾ 20% aqueous solution	0.2
D	Citric acid 10% aqueous sol. till pH 3.5-4	q.s.
	T O T A L:	100

1) Genamin KDM P, Clariant

2) Tylose H10 Y G4, Shin Etsu

3) Lanette O, BASF

4) Arlacel 165-FP-MBAL-PA-(RB), Croda

5) Incroquat Behenyl TMS-50-MBAL-PA-(MH) HA4112, Croda

6) SP Brij S20 MBAL-PA(RB), Croda

7) Xiameter DC MEM-0949 Emulsion, Dow Corning

8) Alfa Aesar

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Example 7

Shampoo composition

Microcapsules A-H of the present invention are weighed and mixed in a shampoo composition to add the equivalent of 0.2% perfume.

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Table 7 – Shampoo composition

	Ingredients	Concentration [wt %]
A	Water deionized	44.4
	Polyquaternium-10 ¹⁾	0.3

	Glycerin 85% ²⁾	1
	DMDM Hydantoin ³⁾	0.2
B	Sodium Laureth Sulfate ⁴⁾	28
	Cocamidopropyl Betaine ⁵⁾	3.2
	Disodium Cocoamphodiacetate ⁶⁾	4
	Ethoxy (20) Stearyl Alcohol ⁶⁾	1
C	Sodium Laureth Sulfate ⁴⁾	3
	Glyceryl Laureate ⁷⁾	0.2
D	Water deionized	1
	Sodium Methylparaben ⁸⁾	0.1
E	Sodium Chloride 10% aqueous sol.	15
	Citric acid 10% aqueous sol. till pH 5.5-6	q.s.
	Perfume	0.5
	T O T A L:	100

- 1) Ucare Polymer JR-400, Noveon
- 2) Schweizerhall
- 3) Glydant, Lonza
- 4) Texapon NSO IS, Cognis
- 5) Tego Betain F 50, Evonik
- 6) Amphotensid GB 2009, Zschimmer & Schwarz
- 7) Monomuls 90 L-12, Gruenau
- 8) Nipagin Monosodium, NIPA

Example 8Antiperspirant roll-on emulsion composition

Microcapsules A-H of the present invention are weighed and mixed in antiperspirant roll-on
 5 emulsion composition to add the equivalent of 0.2% perfume.

Table 8 – Antiperspirant composition

Ingredient	Amount (wt %)
Steareth-2 ¹⁾ (Part A)	3.25
Steareth-21 ²⁾ (Part A)	0.75
PPG-15 Stearyl Ether ³⁾ (Part A)	4
WATER deionised (Part B)	51
Aluminum Chlorohydrate 50% aqueous solution ⁴⁾ (Part C)	40
Fragrance (Part D)	1

- 1) BRIJ 72; origin : ICI
 2) BRIJ 721; origin : ICI
 10 3) ARLAMOL E; origin : UNIQEMA-CRODA
 4) LOCRON L; origin : CLARIAN

Part A and B are heated separately to 75°C; Part A is added to Part B under stirring and the mixture
 is homogenized for 10 min. Then, the mixture is cooled under stirring; and Part C is slowly added
 15 when the mixture reached 45°C and Part D when the mixture reached at 35 °C while stirring. Then
 the mixture is cooled to room temperature.

Example 9Shower-gel composition

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Microcapsules A-H of the present invention are weighed and mixed in the following composition
 to add the equivalent of 0.2% perfume.

Table 9 – Shower gel composition

Ingredients	Amount (% wt)	Function
WATER deionized	49.350	Solvent
Tetrasodium EDTA ¹⁾	0.050	Chelating agent
Acrylates Copolymer ²⁾	6.000	Thickener
Sodium C12-C15 Pareth Sulfate ³⁾	35.000	Surfactant
Sodium Hydroxide 20% aqueous solution	1.000	pH adjuster
Cocamidopropyl Betaine ⁴⁾	8.000	Surfactant
Methylchloroisothiazolinone and Methylisothiazolinone ⁵⁾	0.100	Preservative
Citric Acid (40%)	0.500	pH adjuster

1) EDETA B POWDER; trademark and origin: BASF

2) CARBOPOL AQUA SF-1 POLYMER; trademark and origin: NOVEON

3) ZETESOL AO 328 U; trademark and origin: ZSCHIMMER & SCHWARZ

5 4) TEGO-BETAIN F 50; trademark and origin: GOLDSCHMIDT

5) KATHON CG; trademark and origin: ROHM & HASS

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CLAIMS

1. A core-shell microcapsule comprising:
 - a) an oil-based core comprising a hydrophobic material, preferably a perfume oil; and
 - 5 b) a polymeric shell comprising a regenerated biopolymer.
2. The microcapsule according to claim 1, wherein the polymeric shell is made of a polymeric material selected from the group consisting of polyurea, polyurethane, polyamide, polyacrylate, polysiloxane, polycarbonate, polysulfonamide, urea formaldehyde, melamine formaldehyde resin,
10 melamine urea resin, melamine glyoxal resin, gelatin/ gum arabic and mixtures thereof.
3. The microcapsule according to claim 2, wherein the polymeric shell is made of a polymeric material selected from the group consisting of polyurea, polyurethane, polyamide and mixtures thereof.
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4. The microcapsule according to anyone of the preceding claims, wherein the regenerated biopolymer is selected from the group consisting of regenerated cellulose, regenerated chitin, regenerated lignocellulose, regenerated silk fibroin, regenerated pectin, regenerated alginic acid and mixtures thereof.
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5. The microcapsule according to anyone of the preceding claims, wherein the polymeric shell comprises less than 20% by weight of a polymeric material based on the total weight of the microcapsule.
- 25 6. The microcapsule according to anyone of the preceding claims, wherein the hydrophobic material comprises a perfume oil.
7. A process for preparing core-shell microcapsules as defined in anyone of claims 1-6, wherein the process comprises the steps of:
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 - 1) suspending in water a regenerated biopolymer to form a water phase;
 - 2) preparing an oil phase comprising a hydrophobic material, preferably a perfume oil;

3) adding the oil phase to the water phase and mixing them to form an oil-in-water Pickering emulsion, under conditions allowing the formation of core-shell microcapsule by interfacial polymerization and/or interfacial reaction,

wherein a polyfunctional monomer is added in step 1) in the water phase and/or in step 2) in the oil phase and/or in step 3) in the emulsion.

8. The process according to claim 7, wherein the polyfunctional monomer is chosen in the group consisting of at least one polyisocyanate, poly maleic anhydride, poly acid chloride, polyepoxide, acrylate monomers, polyalkoxysilane, melamine-based resin and mixtures thereof.

9. The process according to claim 7 or 8, wherein the regenerated biopolymer is obtained by a process comprising the following steps:

(i) Dispersing a natural biopolymer into water and/or dissolving a natural biopolymer into a solvent to form a homogeneous solution

(ii) Adding an anti-solvent into the solution obtained in step (i) or removing the solvent from the solution obtained in step (i) to obtain a precipitated biopolymer

(iii) Dispersing the precipitated biopolymer into water and treating via high-pressure homogenizer to obtain a regenerated biopolymer suspension.

10. The process according to any one of claims 7-9, wherein the oil-in-water Pickering emulsion is formed at room temperature or at a temperature below room temperature, preferably at a temperature comprised between 0°C and 10°C.

11. The process according to any one of claims 7-10, wherein a reactant is added in step 1) and/or step 3).

12. The process according to any one of claims 7-11, wherein the total amount of regenerated biopolymer is comprised between 0.01 and 10 wt%, preferably between 0.01 and 5 wt% based on the total weight of the water phase.

13. The process according to any one of claims 7-12, characterized in that the oil phase represents between 5 and 60%, preferably between 20 and 40% by weight of the Pickering emulsion.

5 **14.** A consumer product comprising:

- a personal care active base, and
- microcapsules as defined in claims 1-6,

wherein the consumer product is in the form of a personal care composition.

10 **15.** A consumer product comprising:

- a home care or a fabric care active base, and
- microcapsules as defined in claims 1-6,

wherein the consumer product is in the form of a home care or a fabric care composition.

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