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(54) PERFUME CARRIER COMPOSITION COMPRISING BACTERIAL SPORES

PARFUMTRÄGERZUSAMMENSETZUNG MIT BAKTERIENSPOREN

COMPOSITION DE SUPPORT DE PARFUM COMPRENANT DES SPORES BACTÉRIENNES

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- **JULIUS HOESCH GMBH & CO. KG: "Bakteriensporen zur Geruchsvermeidung in wässrigen Systemen oder Reinigerformulierungen Was sind Sporen?", 3 May 2018 (2018-05-03), XP055774781, Retrieved from the Internet <URL:https://www.julius-hoesch.de/wp-content/uploads/2018/05/infos_bakteriensporen_03-05-18.pdf> [retrieved on 20210210]**

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Description

[0001] The present invention relates to a perfume carrier composition comprising bacterial spores and at least one fragrance, wherein the at least one fragrance is at least partially adsorbed to the bacterial spores. The invention further pertains to fragrance loaded bacterial spores obtainable by suspending bacterial spores in a solution containing at least one fragrance as well as the methods of generating these spores, a composition comprising the perfume carrier composition according to the present invention or the fragrance loaded bacterial spores according to the present invention, wherein the composition is selected from a laundry detergent, cleaning detergent, cosmetic composition, food product, a packaging or a coating composition, and the use of the perfume carrier composition according to the present invention or the fragrance loaded bacterial spores according to the present invention for the controlled release of the fragrance.

[0002] In the field of cleaning and laundry detergents fragrances, including perfumes and perfume oils, are used to provide the treated surfaces with a pleasant odor. In the recent years, fragrances are increasingly employed in the form of perfume microcapsules in order to obtain a long lasting pleasant odor. The microcapsules allow the controlled release of the fragrance, for example by allowing diffusion across the microcapsule shell or by being friable, i.e. breaking of the shell and release of the fragrance upon mechanical stress, such as shearing. However, commonly used microcapsules are typically based on synthetic polymers and thus belong to the group of microplastics. Recently, the slow degradability, accumulation in marine life and the difficulties to recover them from wastewater have raised concerns as to the widespread use of microplastics.

[0003] It is therefore an object of the present invention to provide a delivery system for fragrances, including perfumes and perfume oils, which is able to provide a long lasting fragrance perception similar to perfume microcapsules while at the same time overcoming the inherent drawbacks of microplastics. The inventors of the present invention have surprisingly found that bacterial spores are suitable as carriers for fragrances, providing a long lasting scent experience, in particular after a cleaning or washing step. These carriers are not only microplastic-free, but are also of natural origin and biodegradable. Thus, they are conserving resources, are environmentally friendly and require less efforts and costs in their production compared to commonly used perfume microcapsules.

[0004] WO 2017/0100945 A1 discloses spores, particularly plant spores, engineered to encapsulate compounds or substances. An article published by Julius Hoesch GmbH & Co. KG ("Bakteriensporen zur Geruchsvermeidung in wässrigen Systemen oder Reinigerformulierungen Was sind Sporen?") discloses the use of bacterial spores for the prevention of malodor. EP 3819361 A1 discloses compositions comprising particles containing a non-germinant carrier and bacterial endospores. The compositions may further comprise a perfume. WO 2018/013729 A1 discloses a bioenzymatic, concentrated cleaning product, comprising 15 to 55% bacillus spores, a suspending and/or rheology modifying agent, an odor control agent, sufficient pH adjuster to maintain a pH of about 5.0 to about 9.5, and water. However, these documents do not disclose the use of bacterial spores as perfume carriers.

[0005] In a first aspect, the present invention therefore relates to a perfume carrier composition as defined in the claims.

[0006] In various embodiments, the perfume carrier composition comprises at least 10 wt.-% of fragrance loaded bacterial spores based on the total weight of the perfume carrier composition.

[0007] In a second aspect, the present invention pertains to fragrance loaded bacterial spores as defined in the claims, obtainable by suspending bacterial spores in a solution containing at least one fragrance. In various embodiments, the solution comprises at least 50 wt.-% of the at least one fragrance, based on the total weight of the solution.

[0008] In a third aspect, the present invention refers to a composition comprising the perfume carrier composition according to the present invention or the fragrance loaded bacterial spores according to the present invention, wherein the composition is selected from a laundry detergent, cleaning detergent, cosmetic composition, food product, a packaging or a coating composition.

[0009] Finally, in a fourth aspect, the present invention relates to the use of the perfume carrier composition according to the present invention or the fragrance loaded bacterial spores according to the present invention for the retarded release of the fragrance, preferably after a cleaning, washing or laundry drying step.

[0010] "One or more", as used herein, relates to "at least one" and comprises 1, 2, 3, 4, 5, 6, 7, 8, 9 or more of the referenced species. Similarly, "at least one" means "one or more", i.e. 1, 2, 3, 4, 5, 6, 7, 8, 9 or more. "At least one", as used herein in relation to any component, refers to the number of chemically different atoms or molecules, i.e. to the number of different types of the referenced species, but not to the total number of atoms or molecules. For example, "at least one fragrance" means that at least one type of fragrance can be part of the composition, but that also two or more different fragrances can be present, but does not mean that several compounds of only one type of fragrance may be present.

[0011] Numeric values specified without decimal places refer to the full value specified with one decimal place. For example, "99 %" means "99.0 %", if not stated otherwise.

[0012] The expressions "approx." or "about", in con-

junction with a numerical value, refer to a variance of ± 10 % relative to the given numerical value, preferably ± 5 %, more preferably ± 1 %, if not explicitly stated otherwise.

[0013] All percentages given herein in relation to the respective compositions relate to weight-% (wt.-%) relative to the total weight of the respective composition, if not explicitly stated otherwise.

[0014] The expression "essentially consisting of" means that further compounds, not mentioned in the claim can be contained in the composition in principle, but are present in a quantity that does not interfere with a function of the described compounds in the claims. In the context of the present invention, the term "essentially consisting of" preferably allows the presence of further compounds up to a total weight of 10.0 wt.-%, more preferably up to 5.0 or 2.0 wt.-%, more preferably up to 0.5 wt.-%, in particular up to 0.1 wt.-%, based on the total weight of the respective composition.

[0015] Numeric ranges specified in the format "in/-from x to y" include the values specified. If several preferred numeric ranges are specified in this format, it goes without saying that all ranges resulting from the combination of the different endpoints will also be included.

[0016] These and other aspects, features, embodiments, and advantages of the invention become apparent to the skilled person in the following detailed description and claims. Each feature or embodiment from one aspect of the invention can be used in any other aspect of the invention. Additionally, each feature or embodiment of the compound, use or composition can be combined with any other feature or embodiment of the compound, use or composition. Furthermore, the examples contained herein are intended to describe and illustrate the invention, but do not restrict it and in particular, the invention is not limited to these examples.

[0017] In general, even when reference is made herein to spores of one species or strain, it is always understood that combinations of bacterial spores of one or more of such species and/or strains may also be used, such as, blends of two or more strains, three or more strains, four or more strains, five or more strains, etc.

[0018] The present invention in particular relates to:
A perfume carrier composition according to claim 1 comprising, consisting essentially of or consisting of

bacterial spores; and
at least one fragrance; wherein
the perfume carrier composition comprises fragrance loaded bacterial spores.

[0019] In various embodiments, the perfume carrier composition according the present invention comprises at least 10 wt.-%, or 15 wt.-%, or 20 wt.-%, or 25 wt.-%, or 30 wt.-%, or 35 wt.-%, or 40 wt.-% or 45 wt.-%, or 50 wt.-%, or 55 wt.-%, or 60 wt.-%, or 65 wt.-%, or 70 wt.-%, or 75 wt.-%, or 80 wt.-%, or 85 wt.-%, or 90 wt.-%, or 95 wt.-%, or 98 wt.-%, or 99 wt.-% of fragrance loaded bacterial spores, based on the total weight of the perfume carrier composition.

[0020] The fragrance loaded bacterial spores are obtainable by suspending bacterial spores in a solution containing at least one fragrance, wherein the solution preferably comprises at least 20 wt.-%, at least 30 wt.-%, at least 40 wt.-% or at least 50 wt.-%, 55 wt.-%, 60 wt.-%, 65 wt.-%, 70 wt.-%, 75 wt.-%, 80 wt.-%, 85 wt.-%, 90 wt.-%, 95 wt.-%, 98 wt.-%, or 99 wt.-% of the at least one fragrance, based on the total weight of the solution. By suspending the bacterial spores in the at least one fragrance containing solution, the fragrance adsorbs at the surface of the spores and thus forms a complex, which is suitable to be used as a delivery system for the at least one fragrance, after the fragrance loaded bacterial spores are applied to a surface, in particular a textile.

[0021] In a preferred embodiment the spores are suspended in an excess of fragrance in order to adsorb as much fragrance as possible.

[0022] The term "fragrance loaded bacterial spores", as used herein, relates to bacterial spores treated such that they have fragrance molecules adsorbed to their surface. In various embodiments, this term covers spores that are saturated with fragrance molecules such that their maximum adsorption capacity is met or at least 90% met. The weight ratio of bacterial spores to fragrances molecules adsorbed to their surface may, in various embodiments, range from 100:1 to 1:100, from 50:1 to 50:1, from 20:1 to 1:20, from 10:1 to 1:10 or from 5:1 to 1:5.

[0023] The solution used for loading the spores can consist of at least one fragrance, typically a mixture of fragrances is used. Suitable solvents can be additionally present. The solvents can be organic solvents or water. It is preferred that additional solvents are only contained in amounts of up to 40, up to 30, up to 20 wt.-%, more preferably up to 10 wt.-% of the solution.

[0024] The ability to prepare spores and vegetative cells is considered routine in the art. See for example Tzeng, Y. M., Y. K. Rao, et al. (2008). "Effect of cultivation conditions on spore production from Bacillus amyloliquefaciens B128 and its antagonism to Botrytis elliptica." Journal of Applied Microbiology 104(5): 1275-1282. Generally, bacterial spores
are highly resistant, dormant structures (i.e. no metabolic activity) formed by bacteria in response to adverse environmental conditions. They help in the survival of the organisms during adverse environmental conditions and do not have a role in reproduction. An endospore is structurally and chemically more complex than the vegetative cell. It contains more layers than vegetative cells and may comprise a spore wall, a cortex (usually made of peptidoglycans) and a keratin spore coat as the outermost layer. Optionally, the kera-

tin spore coat can be covered by an exosporium. When the favorable conditions prevail, (i.e. availability of water, appropriate nutrients) spore germination occurs such that vegetative cells of bacteria are formed. Bacterial spores (endospores) are typically formed by gram positive bacteria. Some classes of bacteria can however turn into exospores. While the term bacterial spores as used herein generally covers both types, the bacterial spores are preferably endospores.

[0025] The bacterial spores used in the invention are selected from at least one species of *Desulfotomaculum* or *Sporosarcina* or a mixture thereof.

[0026] Alternatively, the bacterial spores are selected from the group consisting of *Bacillus agaradhaerens, Bacillus alcalophilus, Bacillus amyloliquefaciens, Bacillus arseniciselenatis, Bacillus atrophaeus, Bacillus azotoformans, Bacillus badius, Bacillus benzoevorans, Bacillus carboniphilus, Bacillus chitinolyticus, Bacillus circulans, Bacillus clarkia, Bacillus clausii, Bacillus coagulans, Bacillus cohnii, Bacillus edaphicus, Bacillus ehimensis, Bacillus fastidiosus, Bacillus firmus, Bacillus flexus, Bacillus fumarioli, Bacillus fusiformis, Bacillus gibsonii, Bacillus halmapalus, Bacillus haloalkaliphilus, Bacillus halodenitrificans, Bacillus halophilus, Bacillus horikoshii, Bacillus horti, Bacillus infernus, Bacillus insolitus, Bacillus jeotgali, Bacillus laevolacticus, Bacillus lentus, Bacillus licheniformis, Bacillus marinus, Bacillus megaterium, Bacillus methanolicus, Bacillus mojavensis, Bacillus mucilaginosus, Bacillus mycoides, Bacillus naganoensis, Bacillus niacini, Bacillus oleronius, Bacillus pallidus, Bacillus pseudalcaliphilus, Bacillus pseudofirmus, Bacillus pseudomycoides, Bacillus psychrosaccharolyticus, Bacillus pumilus, Bacillus schlegelii, Bacillus selenitireducens, Bacillus silvestris, Bacillus simplex, Bacillus siralis, Bacillus smithii, Bacillus sonorensis, Bacillus sphaericus, Bacillus sporothermodurans, Bacillus subtilis* (including subsp. *spizizenii and subtilis), Bacillus thermoamylovorans, Bacillus thermocloaceae, Bacillus thuringiensis, Bacillus tusciae, Bacillus vallismortis, Bacillus vedderi,* and *Bacillus vulcani* or combinations thereof. Preferably, they are selected from those of any one of *Bacillus amyloliquefaciens, Bacillus clarkii, Bacillus clausii, Bacillus firmus, Bacillus licheniformis, Bacillus mojavensis, Bacillus pumilis, Bacillus subtilis, Bacillus tequilensis, and Bacillus vulcani* or a mixture thereof.

[0027] In various embodiments, the bacterial spores are contained in a concentration of 1 - $5x10^{12}$ CFU/g of the perfume carrier composition, with a preferred range of $1x10^{2}$ - $5x10^{10}$ CFU/g of the perfume carrier composition. Effective amounts can be determined by one skilled in the art using routine assays.

[0028] In addition to the bacterial spores the perfume carrier composition comprises at least one fragrance. In general, every known fragrance, which is able to provide alone or in combination with other fragrances a pleasant smell is considered to be suitable.

[0029] The preferred fragrances that may be used are not subject to any restrictions. Thus in particular synthetic or natural odorant substance compounds of the types of esters, ethers, aldehydes (fragrance aldehydes, odorant aldehydes), ketones (fragrance ketones, odorant ketones), alcohols, hydrocarbons, acids, carbonic acid esters, aromatic hydrocarbons, aliphatic hydrocarbons, saturated and/or unsaturated hydrocarbons and mixtures of these may be used as fragrance substances.

[0030] Individual fragrance compounds, e.g. synthetic products of the ester, ether, aldehyde, ketone, alcohol, and hydrocarbon types, can be used as well as mixtures thereof. It is preferred, however, to use mixtures of different fragrances, which together generate an attractive scent note. Such mixtures, in the following referred to as perfume oils or perfumes as well, can also contain natural fragrance mixtures such as those accessible from plant sources, for example pine, citrus, jasmine, patchouli, rose, or ylang-ylang oil. In order to be perceptible, a fragrance must be volatile; in addition to the nature of the functional groups and the structure of the chemical compound, the molecular weight also plays an important part. Most fragrances, for example, possess molar weights of up to approximately 200 g/mol, while molar weights of 300 g/mol and above are rather exceptional. Because of the differing volatility of fragrances, the odor of a perfume or fragrance made up of multiple fragrances changes during volatilization, the odor impressions being subdivided into a "top note", "middle note" or "body," and "end note" or "dry out." Because the perception of an odor also depends in a large part on the odor intensity, the top note of a perfume or scent is not made up only of highly volatile compounds, while the end note comprises for the most part less-volatile, i.e., adherent fragrances.

[0031] Suitable fragrances of the ester type include, for example, benzyl acetate, phenoxyethyl isobutyrate, p-tert-butylcyclohexyl acetate, linalyl acetate, dimethylbenzylcarbinyl acetate (DMBCA), phenylethyl acetate, benzyl acetate, ethylmethylphenyl glycinate, allylcyclohexyl propionate, styrallyl propionate, benzyl salicylate, cyclohexyl salicylate, floramate, melusate and jasmacyclate. Odorant substance compounds of the hydrocarbon type include, for example, terpenes such as limonene and pinene.

[0032] Suitable fragrances of the ether type include, for example, benzylethyl ether and ambroxan. Suitable fragrance substance alcohol include, for example, 10-undecen-1-ol, 2,6-dimethylheptan-2-ol, 2-methylbutanol, 2-methylpentanol, 2-phenoxyethanol, 2-phenylpropanol, 2-tert-butylcyclohexanol, 3,5,5-trimethylcyclohexanol, 3-hexanol, 3-methyl-5-phenylpentanol, 3-octanol, 1-octen-3-ol, 3-phenylpropanol, 4-heptenol, 4-isopropylcyclohexanol, 4-tert-butylcyclohexanol, 6,8-dimethyl-2-nonanol, 6-nonen-1-ol, 9-decen-1-ol, a-methylbenzyl alcohol, α-terpineol, amyl salicylate, benzyl alcohol, benzyl salicylate, β-terpineol, butyl salicy-

late, citronellol, cyclohexyl salicylate, decanol, dihydromyrcenol, dimethylbenzylcarbinol, dimethylheptanol, dimethyloctanol, ethyl salicylate, ethyl vanillin, anethol, eugenol, geraniol, heptanol, hexyl salicylate, isoborneol, isoeugenol, isopulegol, linalool, menthol, myrtenol, n-hexanol, nerol, nonanol, octanol, para-menthan-7-ol, phenylethyl alcohol, phenol, phenyl salicylate, tetrahydrogeraniol, tetrahydrolinalool, thymol, trans-2-cis-6-nonadienol, trans-2-nonen-1-ol, trans-2-octenol, undecanol, vanillin, cinnamic alcohol, wherein when multiple fragrance substance alcohols are present, they may be selected independently of one another.

[0033] In various embodiment, the perfume carrier composition according to the present invention comprises at least one fragrance, which is selected from terpenes, ketones, aldehydes and mixtures thereof.

[0034] As fragrance aldehydes or fragrance ketones, all the conventional fragrance aldehydes and fragrance ketones may be used which are typically used to induce a pleasant fragrance perception.

[0035] Suitable fragrance aldehydes and fragrance ketones are familiar to those skilled in the art. The fragrance ketones may comprise all ketones which are able to impart a desired fragrance or a fresh perception, for example, the below-mentioned aldehydes and ketones. Mixtures of different aldehydes and/or ketones may also be used.

[0036] The fragrance aldehydes and fragrance ketones may have an aliphatic, cycloaliphatic, aromatic, ethylenically unsaturated structure or a combination of these structures. Furthermore, there may be additional heteroatoms or polycyclic structures. These structures may have suitable substituents such as hydroxyl groups or amino groups.

[0037] For further suitable fragrances selected from aldehydes and ketones, reference is made to Steffen Arctander published 1960 and 1969, respectively, reprinted 2000 ISBN: Aroma Chemicals, vol. 1: 0-931710-37-5, Aroma Chemicals, vol. 2: 0-931710-38-3.

[0038] Suitable fragrance ketones can include all ketones that can lend a desired scent or a sensation of freshness. Mixtures of different ketones can also be used. For example the ketone can be selected from the group consisting of buccoxime, iso-jasmone, methyl beta-naphthyl ketone, Moschus indanone, Tonalid/-Moschus plus, alpha-damascone, beta-damascone, delta-damascone, isodamascone, damascenone, damarose, methyl dihydrojasmonate, menthone, carvone, campher, fenchone, alpha-ionenes, beta-ionone, dihydro-beta-ionone, gamma-methyl so-called ionone, fleuramone, dihydrojasmone, cis-jasmone, iso-E-Super, methyl cedrenyl ketone or methyl cedrylone, acetophenone, methylacetophenone, para-methoxyacetophenone, methyl beta-naphthyl ketone, benzylacetone, benzophenone, para-hydroxy-phenyl butanone, celery ketone or livescone, 6-isopropyldecahydro-2-naphtone, dimethyloctenone, frescomenthe, 4-(1-ethoxyvinyl)-3,3,5,5,-tetramethyl-cyclohexanone, methyl heptenone, 2-(2-(4-methyl-3-cyclohexen-1-yl) propyl)-cyclopentanone, 1-(p-menthen-6(2)-yl)-1-propanone, 4-(4-hydroxy-3-methoxyphenyl)-2-butanone, 2-acetyl-3,3-dimethyl-norbomane, 6,7-dihydro-1,1,2,3,3-pentamethyl-4(5H)-indanone, 4-damascol, dulcinyl or cassion, gelsone, hexalone, isocyclemone E, methyl cyclocitrone, methyl lavender ketone, orivone, para-tert-butylcyclohexanone, verdone, delphone, muscone, neobutenone, plicatone, veloutone, 2,4,4,7-tetramethyl-oct-6-en-3-one, tetrameran, hedione and mixtures thereof. The ketones can preferably be selected from alpha damascone, delta damascone, iso damascone, carvone, gamma-methylionone, iso-E-super, 2,4,4,7-tetramethyl-oct-6-en-3-one, benzylacetone, beta damascone, damascenone, methyl dihydrojasmonate, methyl cedrylone, hedione and mixtures thereof. The ketones may preferably be selected from α-damascone, δ-damascone, isodamascone, carvone, γ-methylionone, iso-E-super, 2,4,4,7-tetramethyloct-6-en-3-one, benzyl acetone, β-damascone, damascenone, methyl dihydrojasmonate, methyl cedrylone, hedione and mixtures of these.

[0039] Suitable fragrance aldehydes can be any aldehydes that produce, like the scent ketones, a desired scent or a sensation of freshness. Once again, they may be individual aldehydes or mixtures of aldehydes. Exemplary suitable aldehydes are melonal, triplal, ligustral, adoxal, anisaldehyde, cymal, ethylvanillin, florhydral, helional, heliotropine, hydroxycitronellal, koavone, laurinaldehyde, lyral, methylnonyl-acetaldehyde, p, t-bucinal, phenylacetaldehyde, undecylene aldehyde, vanillin, 2,6,10-trimethyl-9-andecenal, 3-dodecen-1-al, alpha-n-amylcinnamaldehyde, 4-methoxybenzaldehyde, benzaldehyde, 3-(4-tert-butylphenyl)-propanal, 2-methyl-3-(para-methoxyphenylpropanal), 2-methyl-4-(2,6,6-trimethyl-2(1)-cyclohexen-1-yl)butanal, 3-phenyl-2-propenal, cis-/trans-3,7-dimethyl-2,6-octadien-1-al, 3,7-dimethyl-6-octen-1-al, [(3,7-dimethyl-6-octenyl)oxy]acetaldehyde, 4-isopropylbenzyaldehyde, 1,2,3,4,5,6,7,8-octahydro-8,8-dimethyl-2-naphthaldehyde, 2,4-dimethyl-3-cyclohexen-1-carboxyaldehyde, 2-methyl-3-(isopropyl-phenyl)propanal, decyl aldehyde, 2,6-dimethyl-5-heptenal, 4-(tricyclo[5.2.1.0 (2,6)]-decylidene-8)-butanal, octahydro-4,7-methano-1H-indene carboxaldehyde, 3-ethoxy-4-hydroxybenzaldehyde, para-ethyl-alpha,alpha-dimethylhydrocinnamaldehyde, alpha-methyl-3,4-(methylenedioxy)-hydrocinnamaldehyde, 3,4-methylenedioxybenzaldehyde, alpha-n-hexylcinnamaldehyde, m-cymene-7-carboxaldehyde, alpha-methylphenylacetaldehyde, 7-hydroxy-3,7-dimethyloctanal, undecenal, 2,4,6-trimethyl-3-cyclohexene-1-carboxaldehyde, 4-(3) (4-methyl-3-pentenyl)-3-cyclohexene carboxaldehyde, 1-dodecanal, 2,4-dimethyl cyclohexene-3-carboxaldehyde, 4-(4-hydroxy-4-methylpentyl)-3-cyclohexene-1-carboxaldehyde, 7-methoxy-3,7-dimethyloctan-1-al, 2-methylundecanal,

2-methyldecanal, 1-nonanal, 1-octanal, 2,6,10-trimethyl-5,9-undecadienal, 2-methyl-3-(4-tertbutyl)propanal, dihydrocinnamaldehyde, 1-methyl-4-(4-methyl-3-pentenyl)-3-cyclohexene-1-carboxaldehyde, 5 or 6-methoxyhexahydro-4,7-methanoindane-1 or 2-carboxyaldehyde, 3,7-dimethyloctan-1-al, 1-undecanal, 10-undecen-1-al, 4-hydroxy-3-methoxybenzaldehyde, 1-methyl-3-(4-methylpentyl)-3-cyclohexene carboxyaldehyde, 7-hydroxy-3,7-dimethyl-octanal, trans-4-decenal, 2,6-nonadienal, para-tolyl-acetaldehyde, 4-methylphenylacetaldehyde, 2-methyl-4-(2,6,6-trimethyl-1-cyclohexen-1-yl)-2-butenal, ortho-methoxycinnamaldehyde, 3,5,6-trimethyl-3-cyclohexene carboxaldehyde, 3,7-dimethyl-2-methylene-6-octenal, phenoxyacetaldehyde, 5,9-dimethyl-4,8-decadienal, peony aldehyde (6,1-dimethyl-3-oxa-5,9-undecadien-1-al), hexahydro-4,7-methanoindane-1-carboxaldehyde, 2-methyloctanal, alpha-methyl-4-(1-methylethyl) benzeneacetaldehyde, 6,6-dimethyl-2-norpinene-2-propionaldehyde, para-methylphenoxyacetaldehyde, 2-methyl-3-phenyl-2-propen-1-al, 3,5,5-trimethylhexanal, hexahydro-8,8-dimethyl-2-naphthaldehyde, 3-propyl-bicyclo [2.2.1]-hept-5-ene-2-carbaldehyde, 9-decenal, 3-methyl-5-phenyl-1-pentanal, methylnonylacetaldehyde, 1-p-menthene-q-carboxaldehyde, citral or mixtures thereof, lilial citral, 1-decanal, florhydral, 2,4-dimethyl-3-cyclohexene-1-carboxaldehyde, preferred aldehydes can be selected from cis/trans-3,7-dimethyl-2,6-octadien-1-al, heliotropin, 2,4,6-trimethyl-3-cyclohexene-1-carboxaldehyde, 2,6-nonadienal, alpha-n-amylcinnamaldehyde, alpha-n-hexylcinnamaldehyde, p-tert-bucinal, lyral, cymal, methylnonylacetaldehyde, trans-2-nonenal, lilial, trans-2-nonenal and mixtures thereof.

[0040] Fragrance substances and/or perfume oils may also be natural odorant mixtures such as those accessible from plant sources, e.g., pine, citrus, jasmine, patchouli, rose or ylang-ylang oil. Also suitable are muscat, sage oil, chamomile oil, clove oil, mint oil, cinnamon leaf oil, lime blossom oil, juniper berry oil, vetiver oil, olibanum [frankincense] oil, galbanum oil and labdanlum oil as well as orange blossom oil, neroli oil, orange peel oil and sandalwood oil. The fragrance substances and/or perfume oils may also be essential oils, for example, angelica root oil, anise oil, arnica blossom oil, basal oil, bay oil, champaca blossom oil, silver fir oil, silver fir cone oil, elemi oil, eucalyptus oil, fennel oil, spruce needle oil, galbanum oil, geranium oil, gingergrass oil, guaiac wood oil, gurjun balsam oil, helichrysum oil, ho leaf oil, ginger oil, iris oil, cajeput oil, calmus oil, chamomile oil, camphor oil, canaga oil, cardamom oil, cassia oil, pine needle oil, copaiva balsam oil, coriander oil, spearmint oil, caraway oil, cumen oil, lavender oil, lemongrass oil, lime oil, mandarin oil, lemon balm oil, musk seed oil, myrrh oil, clove oil, neroli oil, niaouli oil, olibanum oil, origanum oil, palmarosa oil, patchouli oil, peru balsam oil, petit grain oil, pepper oil, peppermint oil, pimento oil, pine oil, rose oil, rosemary oil, sandalwood oil, celery oil, spike oil, stemanis oil, turpentine oil, thuja oil, thyme oil, verbena oil, vetiver oil, juniper berry oil, vermouth oil, wintergreen oil, ylang-ylang oil, ysop oil, cinnamon oil, cinnamon leaf oil, citronella oil, lemon oil and cypress oil.

[0041] In all embodiments described herein, the perfume carrier composition comprises fragrance compounds that are adsorbed to the bacterial spores and, optionally, free fragrance molecules, i.e. fragrance molecules not complexed with or adsorbed to the bacterial spores. In these embodiments, part of a given fragrance ore fragrance mixture may be adsorbed to the bacterial spores while another part is free, i.e. unbound, fragrance. In various embodiments, at least 10 wt.-% of the total fragrance content is adsorbed to the bacterial spores, preferably at least 20 wt.-%, at least 25 wt.-%, 30 wt.-%, 40 wt.-% or at least 50 wt.-%.

[0042] The perfume carrier compositions of the present invention may in an embodiment have a pH in the range of 5-10 and may further include water and/or one or more preservatives. For preservation of compositions comprising bacterial spores of the *Bacillus* genus, for example, the following preservatives can be useful: chloromethylisothiazolinone/methylisothiazolinone (CMIT/MIT) (Kathon or others); MIT (Neolone or others); 1 ,2-benzisothiazolin-3-one (BIT) (if allowed in personal care); CMIT/MIT + EDTA; CMIT/MIT + biodegradable chelator; MIT + EDTA; MIT + biodegradable chelator; BIT + EDTA; BIT + biodegradable chelator; bronopol; 2-phenoxyethanol; 2- phenoxyethanol + biodegradable chelator; potassium sorbate (used at low pH); sodium benzoate (used at low pH); salt; glycerol; propylene glycol; essential oils; dichlorobenzyl alcohol; triclosan; parabens; and 1 -phenoxy-2-propanol and 2-phenoxy-1-propanol. In an embodiment, the preservative is 2-phenoxyethanol; 2-phenoxyethanol + biodegradable chelator; potassium sorbate (used at low pH); sodium benzoate (used at low pH); salt; glycerol; propylene glycol; or one of more essential oils - e.g., white mustard seed, tea tree, rosewood, or some citrus oils. In another embodiment, the preservative is 2-phenoxyethanol; 2-phenoxyethanol + biodegradable chelator; or glycerol.

[0043] In various embodiments, the perfume carrier composition of the invention comprises fragrance loaded bacterial spores and, optionally, free fragrance and/or at least one solvent, preservative or other excipient. In various embodiments, the at least one solvent, preservative or other excipient are present in combined amounts of not more than 30 wt.-%, preferably not more than 20 wt.-% relative to the total weight of the carrier composition. In various embodiments, the perfume carrier composition is provided in form of a suspension or slurry of the spores in a suitable solvent, typically an aqueous solvent, such as water.

[0044] Furthermore, the present invention refers to a composition comprising the perfume carrier composition according to the present invention or the fragrance

loaded bacterial spores according to the present invention, wherein the composition is selected from a laundry detergent, cleaning detergent, cosmetic composition, home care composition, room care composition, insecticide, insect repellent, food product, packaging composition, coating composition, adhesive composition, sealants composition, or paint composition.

[0045] These compositions, including the laundry detergent, cleaning detergent, cosmetic composition, food product, a packaging or a coating composition, are known to the skilled person and not subject to any restriction.

[0046] The compositions of the present invention, including those listed above, preferably comprise between 0.001 to 3 wt.-% of the perfume carrier composition, more preferably between 0.01 to 2 wt.-% of the perfume carrier composition.

[0047] In a preferred embodiment the composition is a laundry detergent or cleaning detergent. Cleaning detergents include hand dish washing detergents, automatic dish washing detergents, lavatory cleaning detergents, hard surface cleaning detergents, insect repellent compositions. The compositions can be applied on any textiles or surfaces like metal, plastics, glass and sponges. A composition of the invention may be in solid or liquid form. The composition may be a concentrate to be diluted, rehydrated and/or dissolved in a solvent, including water, before use. The composition may also be a ready-to-use (in-use) composition. The composition may furthermore be an active cleaning base ingredient to be incorporated into other cleaning or washing compositions.

[0048] In one preferred embodiment, the invention provides a composition adapted for application to the interior of a cleaning machine (e.g., laundry washing machine or dish washing machine).

[0049] In addition to the components recited hitherto, the laundry detergent, as well referred to as washing agent, or cleaning detergent, as well referred to as cleaning agent, can contain further ingredients that further improve the applications-engineering and/or aesthetic properties of said agents.

[0050] Preferred agents contain one or more substances from the group of surfactants, electrolytes, pH adjusting agents, dyes, colorants, fluorescing agents, hydrotopes, foam inhibitors, silicone oils, antiredeposition agents, optical brighteners, anti-gray agents, shrinkage preventers, crease prevention agents, color transfer inhibitors, antimicrobial active agents, germicides, fungicides, antioxidants, antistatic agents, ironing adjuvants, proofing and impregnation agents, swelling and anti-slip agents, and UV absorbers.

[0051] The compositions can be applied directly to an article treated (e.g., cleaned) in the cleaning machine or cleaning process, such as, to a laundry treated in the machine. The article may be treated before cleaning, during the cleaning process, after the cleaning processes and any combination thereof. Examples of such articles to be treated include laundry, carpets, and fabrics.

[0052] The term "fabrics" encompasses all kind of fabrics, textiles, fibers, clothes garments, and fabrics used on, e.g., furniture and cars. The term "laundry" refers to already used and/or stained/soiled clothes in need of washing, and is in contrast to newly manufactured fabrics. Washing laundry may be carried out in private households and in commercial and institutional facilities, such as, hospitals, prisons, uniform service companies. Washing of newly manufactured fabrics is mainly done in the textile industry. The fabric or laundry may be made from any suitable material. In preferred embodiments the fabrics and/or laundry are made from cellulosic materials, synthetic materials and/or man-made fibers, or blends thereof. Examples of contemplated cellulosic materials include cotton, viscose, rayon, ramie, linen, lyocell (e.g., TENCEL™, produced by Courtaulds Fibers), or blends thereof, or blends of any of these fibers together with synthetic or man-made fibers (e.g., polyester, polyamide, nylon) or other natural fibers such as wool and silk., such as viscose/cotton blends, lyocell/cotton blends, viscose/wool blends, lyocell/wool blends, cotton/wool blends; flax (linen), ramie and other fabrics and/or laundry based on cellulose fibers, including all blends of cellulosic fibers with other fibers such as wool, polyamide, acrylic and polyester fibers, e.g., viscose/cotton/polyester blends, wool/cotton/polyester blends, flax/cotton blends etc. The fabric and/or laundry may also be a synthetic material, e.g., consisting of essentially 100% polyester, polyamide, nylon, respectively. The term "wool," means any commercially useful animal hair product, for example, wool from sheep, camel, rabbit, goat, llama, and known as merino wool, Shetland wool, cashmere wool, alpaca wool, mohair etc. and includes wool fibers and animal hair. The method of the invention can be used on wool or animal hair material in the form of top, fiber, yarn, or woven or knitted fabrics.

[0053] In one embodiment, the composition is adapted for delivery to a washing machine to prevent fouling by bacterial species capable of causing laundry malodor. In another embodiment, the composition is further adapted for delivery to a washing machine by applications which include, but are not limited to, solid, semi-solid, gel, liquid, aerosol, emulsion, and/or powder applications alone and/or in combination with liquid, solid, semisolid, aerosol, emulsion, and/or gel detergents, alone and/or in combination with liquid, solid, semi-solid, aerosol, emulsion, and/or gel fabric softeners, and/or alone and/or in combination with any other laundry and/or washing machine additive.

[0054] In one aspect, the invention provides a composition adapted for application to a fabric. The composition adapted for delivery to a fabric may be in the form of a solid, semi-solid, gel, liquid, aerosol, emulsion, and/or powder, as a treatment for fabrics to prevent fouling by bacterial species capable of causing laundry

malodor. In another embodiment, the composition is adapted for delivery to a fabric by applications which include, but are not limited to, solid, semi-solid, gel, liquid, aerosol, emulsion, and/or powder applications alone and/or in combination with liquid, solid, semi-solid, aerosol, emulsion, and/or gel detergents, alone and/or in combination with liquid, solid, semi-solid, aerosol, emulsion, and/or gel fabric softeners, and/or alone and/or in combination with any other laundry and/or washing machine additive.

[0055] When used in washing and cleaning agents for household applications, such as detergents, fabric softeners, fabric finishers, laundry performance enhancers, laundry care products, automatic and hand dishwashing products, toilet care products, hard surface cleaners such as cleaners for bathrooms, glass, floors and kitchens, the composition can furthermore contain other usual constituents of washing or cleaning agents, in particular textile washing agents, selected in particular from the group of builders, surfactants, polymers, enzymes, and disintegration adjuvants.

[0056] Washing and cleaning agents preferably contain nonionic, anionic, cationic, and/or amphoteric surfactants.

[0057] Enzymes can be used to increase the performance of washing or cleaning agents. These include in particular proteases, amylases, lipases, hemicellulases, cellulases, perhydrolases, or oxidoreductases, as well as preferably mixtures thereof. These enzymes are in principle of natural origin; proceeding from the natural molecules, improved variants are available for use in washing or cleaning agents and are used in correspondingly preferred fashion. Washing or cleaning agents contain enzymes preferably in total quantities from 1 x 10^{-6} to 5 wt.-%of active enzyme, based on the total weight of the agent.

[0058] Finally, the present invention refers to the use of the perfume carrier composition according to the present invention or the fragrance loaded bacterial spores according to the present invention for the controlled release of the fragrance, preferably after a cleaning, washing or laundry drying step. The release is, in various embodiments, diffusion-controlled.

EXAMPLES

[0059] A bacterial spore suspension of genus *Bacillus* was centrifuged. The supernatant was removed and the bacterial spore pellet was imbibed in a fragrance solution. The obtained spore fragrance suspension (Example 1) was stored at room temperature for three days. Simultaneously the same fragrance solution without spores (Comparative Example 1) and a suspension of spores without fragrance (Comparative Example 2) were stored under the same conditions. After three days, the liquids/suspensions were centrifuged and washed three times (with water and then centrifuged in each step), respectively. Example 1 as well as Comparative Examples 1 and 2 were used in a simulated laundry wash test. For the wash test, a commonly laundry detergent, which was free of perfumes, was used and the textiles washed were cotton textiles having a malodor.

[0060] The textiles were stirred/washed in an aqueous solution containing the respective detergent for 30 minutes at room temperature. Thereafter, the textiles were three times rinsed with water, respectively. The scent impression of the textiles was evaluated by a panel of trained personnel (5 individuals) and rated on a scale from 1 to 3 (1 = malodor; 2 = neutral, no perfume, no malodor; 3 = scent impression, fresh perfume)

[0061] Three tests were performed.

[0062] Test 1: blind test of the laundry detergent without perfume.

[0063] Test 2: Laundry detergent + Example 1:

Test 3: Laundry detergent + Comparative Example 1

Test 4: Laundry detergent + Comparative Example 2.

[0064] The tests were evaluated as follows:

Test 1: Rating 2
Test 2: Rating 3
Test 3: Rating 2
Test 4: Rating 2

[0065] It was shown that the perfume carrier composition according to the present invention can deliver an improved scent impression after a washing step compared to a similar carrier free perfume composition.

Claims

1. A perfume carrier composition comprising, consisting essentially of or consisting of

bacterial spores; and
at least one fragrance; wherein
the perfume carrier composition comprises fragrance loaded bacterial spores; and
wherein the bacterial spores are of at least one species of *Desulfotomaculum or Sporosarcina,* or of at least one of *Bacillus agaradhaerens, Bacillus alcalophilus, Bacillus amyloliquefaciens, Bacillus arseniciselenatis, Bacillus atrophaeus, Bacillus azotoformans, Bacillus badius, Bacillus benzoevorans, Bacillus carboniphilus, Bacillus chitinolyticus, Bacillus circulans, Bacillus clarkia, Bacillus clausii, Bacillus coagulans, Bacillus cohnii, Bacillus edaphicus, Bacillus ehimensis, Bacillus fastidiosus, Bacillus firmus, Bacillus flexus, Bacillus fumarioli,*

Bacillus fusiformis, Bacillus gibsonii, Bacillus halmapalus, Bacillus haloalkaliphilus, Bacillus halodenitrificans, Bacillus halophilus, Bacillus horikoshii, Bacillus horti, Bacillus infernus, Bacillus insolitus, Bacillus jeotgali, Bacillus laevolacticus, Bacillus lentus, Bacillus licheniformis, Bacillus marinus, Bacillus megaterium, Bacillus methanolicus, Bacillus mojavensis, Bacillus mucilaginosus, Bacillus mycoides, Bacillus naganoensis, Bacillus niacini, Bacillus oleronius, Bacillus pallidus, Bacillus pseudalcaliphilus, Bacillus pseudofirmus, Bacillus pseudomycoides, Bacillus psychrosaccharolyticus, Bacillus pumilus, Bacillus schlegelii, Bacillus selenitireducens, Bacillus silvestris, Bacillus simplex, Bacillus siralis, Bacillus smithii, Bacillus sonorensis, Bacillus sphaericus, Bacillus sporothermodurans, Bacillus subtilis (including subsp. *spizizenii and subtilis), Bacillus thermoamylovorans, Bacillus thermocloaceae, Bacillus thuringiensis, Bacillus tusciae, Bacillus vallismortis, Bacillus vedderi,* and *Bacillus vulcani,* or a mixture thereof; and

wherein the at least one fragrance is at least partially adsorbed to the bacterial spores.

2. The perfume carrier composition according to claim 1, wherein the perfume carrier composition comprises, based on the total weight of the perfume carrier composition, at least 10 wt.-%, preferably at least 30 wt.-%, more preferably at least 50 wt.-%, even more preferably at least 90 wt.-%, most preferably at least 99 wt.-% of fragrance loaded bacterial spores, based on the total weight of the perfume carrier composition.

3. The perfume carrier composition according to any of the preceding claims, wherein the bacterial spores are of at least one of *Bacillus amyloliquefaciens, Bacillus clarkii, Bacillus clausii, Bacillus firmus, Bacillus licheniformis, Bacillus mojavensis, Bacillus pumilis, Bacillus subtilis, Bacillus tequilensis, and Bacillus vulcani* or a mixture thereof.

4. The perfume carrier composition according to any of the preceding claims, wherein the bacterial spores are contained in a concentration of 1 - $5x10^{12}$ CFU/g of the perfume carrier composition, with a preferred range of $1x10^{2}$- $5x10^{10}$ CFU/g of the perfume carrier composition.

5. Fragrance loaded bacterial spores obtainable by suspending bacterial spores in a solution containing at least one fragrance,

wherein the bacterial spores are of at least one species of *Desulfotomaculum or Sporosarcina,* or of at least one of *Bacillus agaradhaerens, Bacillus alcalophilus, Bacillus amyloliquefaciens, Bacillus arseniciselenatis, Bacillus atrophaeus, Bacillus azotoformans, Bacillus badius, Bacillus benzoevorans, Bacillus carboniphilus, Bacillus chitinolyticus, Bacillus circulans, Bacillus clarkia, Bacillus clausii, Bacillus coagulans, Bacillus cohnii, Bacillus edaphicus, Bacillus ehimensis, Bacillus fastidiosus, Bacillus firmus, Bacillus flexus, Bacillus fumarioli, Bacillus fusiformis, Bacillus gibsonii, Bacillus halmapalus, Bacillus haloalkaliphilus, Bacillus halodenitrificans, Bacillus halophilus, Bacillus horikoshii, Bacillus horti, Bacillus infernus, Bacillus insolitus, Bacillus jeotgali, Bacillus laevolacticus, Bacillus lentus, Bacillus licheniformis, Bacillus marinus, Bacillus megaterium, Bacillus methanolicus, Bacillus mojavensis, Bacillus mucilaginosus, Bacillus mycoides, Bacillus naganoensis, Bacillus niacini, Bacillus oleronius, Bacillus pallidus, Bacillus pseudalcaliphilus, Bacillus pseudofirmus, Bacillus pseudomycoides, Bacillus psychrosaccharolyticus, Bacillus pumilus, Bacillus schlegelii, Bacillus selenitireducens, Bacillus silvestris, Bacillus simplex, Bacillus siralis, Bacillus smithii, Bacillus sonorensis, Bacillus sphaericus, Bacillus sporothermodurans, Bacillus subtilis* (including subsp. *spizizenii and subtilis), Bacillus thermoamylovorans, Bacillus thermocloaceae, Bacillus thuringiensis, Bacillus tusciae, Bacillus vallismortis, Bacillus vedderi,* and *Bacillus vulcani,* or a mixture thereof; and

wherein the at least one fragrance is at least partially adsorbed to the bacterial spores.

6. The fragrance loaded bacterial spores according to claim 5, wherein the solution comprises at least 1 wt.-%, preferably at least 2, at least 5, at least 10 or at least 20 wt.-%, preferably at least 35 wt.-%, most preferably at least 50 wt.-% of the at least one fragrance, based on the total weight of the solution.

7. A composition comprising the perfume carrier composition according to any of claims 1 to 4 or the fragrance loaded bacterial spores according to claims 5 or 6, wherein the composition is selected from a laundry detergent, cleaning detergent, cosmetic composition, home care composition, room care composition, insecticide, insect repellent, food product, packaging composition, coating composition, adhesive composition, sealants composition, or paint composition.

8. Use of the perfume carrier composition according to any one of claims 1 to 4 or the fragrance loaded bacterial spores according to claims 5 or 6, for the controlled release of the fragrance, preferably after

a cleaning, washing or laundry drying step.

Patentansprüche

1. Eine Parfümträgerzusammensetzung, die umfasst, im Wesentlichen besteht aus oder aus besteht aus

   Bakteriensporen; und
   mindestens einem Duftstoff; wobei
   die Parfümträgerzusammensetzung mit Duftstoffen beladene Bakteriensporen umfasst; und
   wobei die Bakteriensporen von mindestens einer Art der Gattungen *Desulfotomaculum oder Sporosarcina* oder von mindestens einer der folgenden Arten sind*: Bacillus agaradhaerens, Bacillus alcalophilus, Bacillus amyloliquefaciens, Bacillus arseniciselenatis, Bacillus atrophaeus, Bacillus azotoformans, Bacillus badius, Bacillus benzoevorans, Bacillus carboniphilus, Bacillus chitinolyticus, Bacillus circulans, Bacillus clarkia, Bacillus clausii, Bacillus coagulans, Bacillus cohnii, Bacillus edaphicus, Bacillus ehimensis, Bacillus fastidiosus, Bacillus firmus, Bacillus flexus, Bacillus fumarioli, Bacillus fusiformis, Bacillus gibsonii, Bacillus halmapalus, Bacillus haloalkaliphilus, Bacillus halodenitrificans, Bacillus halophilus, Bacillus horikoshii, Bacillus horti, Bacillus infernus, Bacillus insolitus, Bacillus jeotgali, Bacillus laevolacticus, Bacillus lentus, Bacillus licheniformis, Bacillus marinus, Bacillus megaterium, Bacillus methanolicus, Bacillus mojavensis, Bacillus mucilaginosus, Bacillus mycoides, Bacillus naganoensis, Bacillus niacini, Bacillus oleronius, Bacillus pallidus, Bacillus pseudalcaliphilus, Bacillus pseudofirmus, Bacillus pseudomycoides, Bacillus psychrosaccharolyticus, Bacillus pumilus, Bacillus schlegelii, Bacillus selenitireducens, Bacillus silvestris, Bacillus simplex, Bacillus siralis, Bacillus smithii, Bacillus sonorensis, Bacillus sphaericus, Bacillus sporothermodurans, Bacillus subtilis (*einschließlich der Unterarten *spizizenii und subtilis), Bacillus thermoamylovorans, Bacillus thermocloaceae, Bacillus thuringiensis, Bacillus tusciae, Bacillus vallismortis, Bacillus vedderi* und *Bacillus vulcani* oder eine Mischung davon; und
   wobei der mindestens eine Duftstoff zumindest teilweise an die Bakteriensporen adsorbiert ist.

2. Die Duftstoffträgerzusammensetzung nach Anspruch 1, wobei die Duftstoffträgerzusammensetzung, bezogen auf das Gesamtgewicht der Duftstoffträgerzusammensetzung, mindestens 10 Gew.-%, vorzugsweise mindestens 30 Gew.-%, noch bevorzugter mindestens 50 Gew.-%, am meisten bevorzugt mindestens 90 Gew.-% und am allermeisten bevorzugt mindestens 99 Gew.-% mit Duftstoffen beladene Bakteriensporen enthält, bezogen auf das Gesamtgewicht der Duftstoffträgerzusammensetzung.

3. Die Duftstoffträgerzusammensetzung gemäß einem der vorstehenden Ansprüche, wobei die Bakteriensporen von mindestens einer der folgenden Arten sind: *Bacillus amyloliquefaciens*, *Bacillus clarkii, Bacillus clausii, Bacillus firmus, Bacillus licheniformis*, *Bacillus mojavensis, Bacillus pumilis*, *Bacillus subtilis, Bacillus tequilensis und Bacillus vulcani* oder einer Mischung davon.

4. Die Parfümträgerzusammensetzung gemäß einem der vorstehenden Ansprüche, wobei die Bakteriensporen in einer Konzentration von 1 - $5x10^{12}$ KBE/g der Parfümträgerzusammensetzung enthalten sind, mit einem bevorzugten Bereich von $1x10^{2}$ - $5x10^{10}$ KBE/g der Parfümträgerzusammensetzung.

5. Mit Duftstoffen beladene Bakteriensporen, erhältlich durch Suspendieren von Bakteriensporen in einer Lösung, die mindestens einen Duftstoff enthält,

   wobei die Bakteriensporen von mindestens einer Art der Gattungen *Desulfotomaculum oder Sporosarcina* oder mindestens einer der folgenden Arten sind: *Bacillus agaradhaerens, Bacillus alcalophilus, Bacillus amyloliquefaciens, Bacillus arseniciselenatis, Bacillus atrophaeus, Bacillus azotoformans, Bacillus badius, Bacillus benzoevorans, Bacillus carboniphilus, Bacillus chitinolyticus, Bacillus circulans, Bacillus clarkia, Bacillus clausii, Bacillus coagulans, Bacillus cohnii, Bacillus edaphicus, Bacillus ehimensis, Bacillus fastidiosus, Bacillus firmus, Bacillus flexus, Bacillus fumarioli, Bacillus fusiformis, Bacillus gibsonii, Bacillus halmapalus, Bacillus haloalkaliphilus, Bacillus halodenitrificans, Bacillus halophilus, Bacillus horikoshii, Bacillus horti, Bacillus infernus, Bacillus insolitus, Bacillus jeotgali, Bacillus laevolacticus, Bacillus lentus, Bacillus licheniformis, Bacillus marinus, Bacillus megaterium, Bacillus methanolicus, Bacillus mojavensis, Bacillus mucilaginosus, Bacillus mycoides, Bacillus naganoensis, Bacillus niacini, Bacillus oleronius, Bacillus pallidus, Bacillus pseudalcaliphilus, Bacillus pseudofirmus, Bacillus pseudomycoides, Bacillus psychrosaccharolyticus, Bacillus pumilus, Bacillus schlegelii, Bacillus selenitireducens, Bacillus silvestris, Bacillus simplex, Bacillus siralis, Bacillus smithii, Bacillus sonorensis, Bacillus sphaericus, Bacillus sporothermodurans, Bacillus subtilis (*einschließlich der

Unterarten *spizizenii und subtilis), Bacillus thermoamylovorans, Bacillus thermocloaceae, Bacillus thuringiensis, Bacillus tusciae, Bacillus vallismortis, Bacillus vedderi* und *Bacillus vulcani* oder eine Mischung davon; und
wobei der mindestens eine Duftstoff zumindest teilweise an die Bakteriensporen adsorbiert ist.

6. Die mit Duftstoffen beladenen Bakteriensporen gemäß Anspruch 5, wobei die Lösung mindestens 1 Gew.-%, vorzugsweise mindestens 2, mindestens 5, mindestens 10 oder mindestens 20 Gew.-%, vorzugsweise mindestens 35 Gew.-%, am bevorzugtesten mindestens 50 Gew.-% des mindestens einen Duftstoffs, bezogen auf das Gesamtgewicht der Lösung, umfasst.

7. Eine Zusammensetzung, die die Duftstoffträgerzusammensetzung gemäß einem der Ansprüche 1 bis 4 oder die mit Duftstoffen beladenen Bakteriensporen gemäß den Ansprüchen 5 oder 6 umfasst, wobei die Zusammensetzung aus einem Waschmittel, einem Reinigungsmittel, einer kosmetischen Zusammensetzung, einer Haushaltspflegezusammensetzung, einer Raumpflegezusammensetzung, einem Insektizid, einem Insektenschutzmittel, einem Lebensmittelprodukt, einer Verpackungszusammensetzung, einer Beschichtungszusammensetzung, einer Klebstoffzusammensetzung, einer Dichtungsmasse oder einer Lackzusammensetzung ausgewählt ist.

8. Verwendung der Duftstoffträgerzusammensetzung gemäß einem der Ansprüche 1 bis 4 oder der mit Duftstoffen beladenen Bakteriensporen gemäß den Ansprüchen 5 oder 6 zur kontrollierten Freisetzung des Duftstoffs, vorzugsweise nach einem Reinigungs-, Wasch- oder Wäschetrocknungsschritt.

Revendications

1. Composition de support de parfum comprenant, consistant essentiellement en ou étant constituée de

des spores bactériennes ; et
au moins un parfum ; dans laquelle
la composition de support de parfum comprend des spores bactériennes chargées de substances odorantes ; et
les spores bactériennes appartenant à au moins une espèce des genres *Desulfotomaculum ou Sporosarcina*, ou à au moins l'une des espèces suivantes *: Bacillus agaradhaerens, Bacillus alcalophilus, Bacillus amyloliquefaciens, Bacillus arseniciselenatis, Bacillus atrophaeus, Bacillus azotoformans, Bacillus badius, Bacillus benzoevorans, Bacillus carboniphilus, Bacillus chitinolyticus, Bacillus circulans, Bacillus clarkia, Bacillus clausii, Bacillus coagulans, Bacillus cohnii, Bacillus edaphicus, Bacillus ehimensis, Bacillus fastidiosus, Bacillus firmus, Bacillus flexus, Bacillus fumarioli, Bacillus fusiformis, Bacillus gibsonii, Bacillus halmapalus, Bacillus haloalkaliphilus, Bacillus halodenitrificans, Bacillus halophilus, Bacillus horikoshii, Bacillus horti, Bacillus infernus, Bacillus insolitus, Bacillus jeotgali, Bacillus laevolacticus, Bacillus lentus, Bacillus licheniformis, Bacillus marinus, Bacillus megaterium, Bacillus methanolicus, Bacillus mojavensis, Bacillus mucilaginosus, Bacillus mycoides, Bacillus naganoensis, Bacillus niacini, Bacillus oleronius, Bacillus pallidus, Bacillus pseudalcaliphilus, Bacillus pseudofirmus, Bacillus pseudomycoides, Bacillus psychrosaccharolyticus, Bacillus pumilus, Bacillus schlegelii, Bacillus selenitireducens, Bacillus silvestris, Bacillus simplex, Bacillus siralis, Bacillus smithii, Bacillus sonorensis, Bacillus sphaericus, Bacillus sporothermodurans, Bacillus subtilis (*y compris les sous-espèces *spizizenii et subtilis), Bacillus thermoamylovorans, Bacillus thermocloaceae, Bacillus thuringiensis, Bacillus tusciae, Bacillus vallismortis, Bacillus vedderi* et *Bacillus vulcani,* ou un mélange de ceux-ci ; et
la ou les substances odorantes étant au moins partiellement adsorbées sur les spores bactériennes.

2. Composition support de parfum selon la revendication 1, dans laquelle la composition support de parfum contient, par rapport au poids total de la composition support de parfum, au moins 10 % en poids, de préférence au moins 30 % en poids, et de manière encore plus préférée au moins 50 % en poids, de manière encore plus préférée, au moins 90 % en poids et, de manière tout à fait préférée, au moins 99 % en poids de spores bactériennes chargées de substances odorantes, par rapport au poids total de la composition de support de substances odorantes.

3. Composition de support de parfum selon l'une des revendications précédentes, dans laquelle les spores bactériennes appartiennent à au moins l'une des espèces suivantes : *Bacillus amyloliquefaciens*, *Bacillus clarkii, Bacillus clausii, Bacillus firmus, Bacillus licheniformis*, *Bacillus mojavensis, Bacillus pumilis*, *Bacillus subtilis, Bacillus tequilensis et Bacillus vulcani,* ou à un mélange de celles-ci.

4. Composition de support de parfum selon l'une des

revendications précédentes, dans laquelle les spores bactériennes sont présentes à une concentration de 1 à $5x10^{12}$ UFC/g de la composition de support de parfum, avec une plage préférentielle de $1x10^{2}$ à 5×10^{10} UFC/g de la composition de support de parfum.

5. Spores bactériennes chargées de substances odorantes, pouvant être obtenues par mise en suspension de spores bactériennes dans une solution contenant au moins une substance odorante,

les spores bactériennes appartenant à au moins une espèce des genres *Desulfotomaculum ou Sporosarcina*, ou à au moins l'une des espèces suivantes : *Bacillus agaradhaerens, Bacillus alcalophilus, Bacillus amyloliquefaciens, Bacillus arseniciselenatis, Bacillus atrophaeus, Bacillus azotoformans, Bacillus badius, Bacillus benzoevorans, Bacillus carboniphilus, Bacillus chitinolyticus, Bacillus circulans, Bacillus clarkia, Bacillus clausii, Bacillus coagulans, Bacillus cohnii, Bacillus edaphicus, Bacillus ehimensis, Bacillus fastidiosus, Bacillus firmus, Bacillus flexus, Bacillus fumarioli, Bacillus fusiformis, Bacillus gibsonii, Bacillus halmapalus, Bacillus haloalkaliphilus, Bacillus halodenitrificans, Bacillus halophilus, Bacillus horikoshii, Bacillus horti, Bacillus infernus, Bacillus insolitus, Bacillus jeotgali, Bacillus laevolacticus, Bacillus lentus, Bacillus licheniformis, Bacillus marinus, Bacillus megaterium, Bacillus methanolicus, Bacillus mojavensis, Bacillus mucilaginosus, Bacillus mycoides, Bacillus naganoensis, Bacillus niacini, Bacillus oleronius, Bacillus pallidus, Bacillus pseudalcaliphilus, Bacillus pseudofirmus, Bacillus pseudomycoides, Bacillus psychrosaccharolyticus, Bacillus pumilus, Bacillus schlegelii, Bacillus selenitireducens, Bacillus silvestris, Bacillus simplex, Bacillus siralis, Bacillus smithii, Bacillus sonorensis, Bacillus sphaericus, Bacillus sporothermodurans, Bacillus subtilis (*y compris les sous-espèces *spizizenii et subtilis), Bacillus thermoamylovorans, Bacillus thermocloaceae, Bacillus thuringiensis, Bacillus tusciae, Bacillus vallismortis, Bacillus vedderi* et *Bacillus vulcani,* ou un mélange de ceux-ci ; et
la ou les substances odorantes étant au moins partiellement adsorbées sur les spores bactériennes.

6. Les spores bactériennes chargées de substances odorantes selon la revendication 5, la solution comprenant au moins 1 % en poids, de préférence au moins 2, au moins 5, au moins 10 ou au moins 20 % en poids, de préférence au moins 35 % en poids, et de manière encore plus préférée au moins 50 % en poids de ladite au moins une substance odorante, par rapport au poids total de la solution.

7. Composition comprenant la composition de support de parfum selon l'une des revendications 1 à 4 ou les spores bactériennes chargées de substances parfumantes selon les revendications 5 ou 6, ladite composition étant constituée d'un détergent, d'un produit de nettoyage, d'une composition cosmétique, d'une composition d'entretien ménager, d'une composition d'assainissement d'intérieur, d'un insecticide, d'un répulsif anti-insectes, d'un produit alimentaire, d'une composition d'emballage, d'une composition de revêtement, d' d'une composition adhésive, d'un mastic d'étanchéité ou d'une composition de peinture.

8. Utilisation de la composition support de parfum selon l'une des revendications 1 à 4 ou des spores bactériennes chargées de parfum selon les revendications 5 ou 6 pour la libération contrôlée du parfum, de préférence après une étape de nettoyage, de lavage ou de séchage du linge.

REFERENCES CITED IN THE DESCRIPTION

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Patent documents cited in the description

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