

Fragrance compositionField of the Invention

5 The present invention is concerned with fragrance compositions that can be applied to washed fabrics thereby to impart a fresh smell.

Background of the invention

10 Consumers expect that their washed fabrics should come out of the washing machine with a fresh-smelling scent, and that the scent signal should linger during dry-down and for days on the dried fabrics. Traditionally, laundry detergents and fabric conditioners were loaded with fragrance in order to achieve this effect. However, detergents and fabric conditioners can be rather aggressive media for certain fragrance ingredients, limiting the range of perfumery accords that the perfumer can deliver. Also, owing to the manner in which these laundry care products are used in the wash cycle, significant perfume can be lost in waste water during washing and rinse cycles.

15 Comparatively, scent boosters are a more recent addition to the variety of laundry treatment products available on the market. They can be used alongside traditional detergents and fabric conditioners to provide a far more longer-lasting scent-impression on washed fabrics.

20 The more common solid scent boosters are presented in the form of beads or pastilles and are typically added at the start of a wash cycle, dissolving over time to release fragrance, which deposits on laundered fabrics. The relatively less common liquid scent boosters are intended to be added after the wash cycle has been completed. Both formats can provide an enhanced perception of fragrance by the consumer during wet stages of the wash cycle, during dry down, and on dried fabrics.

25 Both formats typically employ both neat and encapsulated fragrances. The neat and encapsulated fragrance combine to provide a continuous and long-lasting fragrance impression on fabrics. Neat fragrance components contribute essentially to enhancing fragrance perception on wet fabrics, while the encapsulated components contribute essentially to enhancing fragrance perception on dry fabrics. Additionally, the encapsulated components may be released during fabric handling, typically under the action of mechanical forces.

30 Unlike solid scent booster compositions, there is relatively little patent literature related to liquid scent booster compositions. WO 2018/073238 discloses a so-called "ringing gel composition", which can be employed as a liquid scent booster. The composition comprises an aqueous phase, a perfume,

a surfactant system and a so-called "linker", which can be one or more of an alcohol, a salt or ester of certain carboxylic acids, fatty acids or their salts or a surfactant.

WO2023067041 discloses a liquid scent booster composition comprising water, as well as neat and encapsulated fragrance. The composition is also characterized in that it contains a surfactant, and a
5 very low loading of encapsulated fragrance.

WO2023006523 discloses a transparent aqueous perfume composition. The perfume composition comprises fragrance oil, but no encapsulated fragrance oil, a solvo-surfactant comprising a monoalkyl glycerol ether, a non-ionic and ionic surfactant, and water. The composition is not a finished consumer product, but is rather intended to be diluted into consumer products, including laundry
10 scent boosters.

US2022387268 discloses an oil-in-water emulsion comprising water, neat fragrance oil, but no encapsulated fragrance oil, surfactant and a stabilizer. The emulsion is further characterized in that it contains a surfactant. The emulsion is not a finished consumer product, but is rather intended to be diluted into consumer products, including laundry scent boosters.

15 The compositions referred to herein above are relatively complex systems, containing number of components of a petrochemical origin that do not contribute an olfactive signal. Principal amongst such components are surfactants. The use of surfactants in compositions containing microencapsulated fragrance is also problematic because they are highly extractive, causing premature leakage of perfume from capsules. In turn, this reduces the ability of such compositions to
20 deliver a time-controlled, long-lasting freshness perception on treated fabrics.

The prior art compositions also contain relatively low levels of fragrance, or are intended to be diluted into consumer product bases. Self-evidently, dilute systems will require greater volume usage in order to achieve a perceivable fragrance signal. Further, the cost of storing and transporting consumer products containing large volumes of water and low levels of fragrance does not represent
25 the most efficient use of resources from an environmental perspective.

There remains a need to provide fabric treatment compositions, more particularly in the form of scent boosters, capable of delivering consumer-perceivable scent signals to washed and laundered fabrics, that are aqueous-based, surfactant-free and yet capable of incorporating high concentrations of fragrance in a stable manner.

30 Summary of the invention

Accordingly, in a first aspect the invention provides a fragrance composition, in particular a fragrance composition for treating fabrics, wherein the composition comprises a plurality of microcapsules

encapsulating a benefit agent suspended in an aqueous suspending medium, and wherein the fragrance composition is free or substantially free of a surfactant.

In a second aspect the invention provides a method of treating a fabric, the method comprising the step of applying to the fabric a fragrance composition according to the first aspect of the invention.

- 5 In a third aspect the invention provides a use of the fragrance composition according to the first aspect of the invention as a fabric treatment composition to provide an olfactory experience connoting a smell of freshness when applied to a fabric.

In a fourth aspect the invention provides a fabric treatment composition consisting essentially of the fragrance composition according to the first aspect of the invention.

- 10 In a fifth aspect the invention provides the fabric treatment composition according to the fourth aspect of the invention packaged in a container adapted for use by a consumer to dispense the composition onto a fabric.

- The details, examples and preferences provided in relation to any one or more of the stated aspects of the present invention will be further described herein and apply equally to all aspects of the present invention. Any combination of embodiments, examples and preferences described herein
15 below in all possible variations thereof are encompassed by the present invention unless otherwise indicated herein, or otherwise clearly contradicted by context.

Detailed description of the invention

- The invention is based on the surprising discovery that a fragrance composition of a very simple
20 construction comprising an aqueous suspending medium in which very high levels of encapsulated fragrance are dispersed, which is free or substantially free of surfactant, nevertheless possesses the requisite stability and viscosity to be easily and uniformly dispensed from a container and into contact with a fabric, and more particularly a washed and/or conditioned fabric, in need of treatment with the composition.

- 25 The use of the term “substantially free” in the context of the present invention means that to the extent that a surfactant is present in the fragrance composition, it is not added to the composition with the intention that it should form part of it, or preferably, is not present at analytically detectable levels, or is not present at all. Accordingly, for the purpose of the present invention if surfactant is present, it is present only incidentally or only as an impurity in one of the other ingredients and not
30 deliberately included in the fragrance composition in an amount to achieve a functional effect. It is preferred that the fragrance composition according to the invention is free of surfactant.

In particular embodiments of the invention the fragrance composition is free or substantially free of any anionic surfactants, cationic surfactants, non-ionic surfactants, zwitterionic surfactants or betaines, having typically a molecular weight of 2000 g/mol or less, more particularly 1000 g/l or less, or any mixtures thereof.

5 As used herein the term fragrance composition refers to a composition that is a finished consumer product intended to be applied to a fabric in need of treatment to deliver an impactful and long-lasting fragrance impression to the fabric. The fragrance composition, as such, is intended to be used to treat fabric. The fragrance composition is not intended to be used as a component of another fabric treatment product, nor is it intended to deliver any other benefit or traditional laundry performance
10 such as cleaning, stain removal, deodorizing or sanitizing effect, and as such does not contain any adjunct active ingredients that can deliver such effects. By way of example, the term fragrance composition as used herein does not include laundry cleaning compositions, laundry detergents, fabric softening compositions, fabric enhancing compositions, laundry pre-wash, laundry pre-treat, laundry rinse additives, wash additives, post-rinse fabric treatment, ironing aids, or the like.

15 In particular embodiments of the invention, the fragrance composition as such is used as a fabric treatment composition, and more particularly a liquid scent booster composition. A scent booster composition is a consumer product that is designed to be added to fabrics after the wash cycle has been completed. Its function is to deposit fragrance onto a washed fabric; it is not intended to deliver any other benefit or traditional laundry performance such as cleaning, stain removal,
20 deodorizing or sanitizing effect, and nor does the composition contain in adjunct active ingredients that can deliver such effects. Typically, a liquid scent booster can be added to the wash load via the laundry conditioner dispensing compartment during a rinse cycle.

The fragrance composition according to the invention is characterized by the very high concentration of encapsulated fragrance that it contains.

25 In particular embodiments of the invention the fragrance composition contains 20 wt.% to 60 wt.%, and more particularly 30 wt.% to 40 wt.% of fragrance-containing microcapsules based on the total weight of the fragrance composition.

In particular embodiments according to the first aspect of the invention, the fragrance composition additionally comprises a neat fragrance dispersed or dissolved in the aqueous suspending
30 medium.

The term "neat fragrance" as used in the present invention refers to a fragrance ingredient or mixture of fragrance ingredients that is or are present in the fragrance composition in un-encapsulated form. The term is not intended to suggest that a neat fragrance contains only

fragrance ingredients. Other common ingredients used in perfumery, such as perfumery solvents and preservatives may also be present in a neat fragrance.

In particular embodiments of the invention the fragrance composition contains from 1 wt.% to 20 wt.% of neat fragrance, more particularly from 2 wt.% to 15 wt.% of neat fragrance, still more particularly from 3 wt.% to 12 wt.%, for example 5 wt.% or 10 wt.% of neat fragrance, based on the total weight of the fragrance composition.

In particular embodiments of the invention the fragrance composition contains from 0.1 wt.% to 20 wt.% of neat fragrance, more particularly from 0.5 wt.% to 15 wt.% of neat fragrance, still more particularly from 2 wt.% to 12 wt.%, for example 5 wt.% or 10 wt.% of neat fragrance, based on the total weight of the fragrance composition.

Considering the high concentration of incorporated encapsulated fragrance and neat fragrance and the fact that the fragrance composition is intended to be applied directly to a fabric in the wash cycle, rather than being diluted as a component part of another laundry treatment product containing an adjunct functional ingredient, such as a surfactant or fabric conditioner, it is possible to create an impactful and long-lasting fragrance impression on a treated fabric.

However, despite the high microcapsule loading in the fragrance composition according to the invention, the fragrance composition can still be easily and uniformly dispensed from a container adapted for that purpose onto a fabric, either directly or via a compartment of a washing machine. In particular, the fragrance composition is substantially homogenous and substantially flowable, even after prolonged periods of storage, such as one month at room temperature, at a temperature including and between 4 °C and 40 °C.

By substantially homogeneous and substantially flow able is meant that the fragrance composition may be easily and uniformly dispensed with only very gentle agitation. Phase separation phenomena, such as creaming and sedimentation, occur very slowly or not at all under the aforementioned storage conditions.

The rate of creaming and sedimentation may be determined by using a so-called Turbiscan AGS instrument. The Turbiscan instrument measures the colloidal stability of a liquid system filled in a vertical tube by measuring the intensity of both the transmitted and the back-scattered light from this liquid system. These intensities allow direct monitoring of local physical heterogeneities with a vertical resolution down to 20µm. Destabilization phenomena (sedimentation or creaming layers, aggregates, agglomerates or coalescence) are detected and monitored over time at different intervals. Such phenomena induce slight variations of the turbidity of the system, which can be represented graphically along a vertical axis. The colloidal stability is given by the Turbiscan Stability

Index (TSI): the lower this index, the higher is the colloidal stability. A full description of how this index is calculated may be found under <https://www.formulaction.com/en/knowledge-center/turbiscan-stability-index>. The TSI value is provided by the software implemented in the Turbiscan AGS instrument.

- 5 In particular embodiments of the present invention, fragrance compositions having a TSI value of less than 5 are considered as stable with respect to phase separation. More preferably, the TSI value of the composition is less than 3.

Another characteristic of fragrance compositions according to the invention is their viscosity. In particular embodiments of the invention the fragrance compositions have a viscosity of from 250 to 1000 mPas, more particularly from 350 to 600 mPas, still more particularly from 350 to 500 mPas
10 when measured by rheometry, using for example a Hacke rheometer equipped with a cone-plate measuring unit P60 Ti-L operating at a shear rate of 21 s^{-1} and a temperature of $25\text{ }^{\circ}\text{C}$. Such a viscosity is significantly higher than that of conventional liquid scent boosters and has the advantage of presenting a rich appearance to consumers and also preventing spillage when the fragrance
15 compositions are dispensed in use.

Applicant surprisingly found that the phase stability of the fragrance composition, as well as its viscosity, was at least unaffected and even improved by the presence of neat (that is non-encapsulated) fragrance oil dissolved or dispersed in the aqueous phase.

It was surprising that large amounts of neat fragrance could be incorporated into the aqueous phase,
20 although the applicant believes without intending to be bound by theory that stabilizing polymers and/or suspending agents contained in the suspending medium somehow sterically stabilize neat fragrance droplets that coexist in suspension with the microcapsules. Stabilizing polymers and suspending agents that may be contained in the suspending medium are described more fully hereinafter.

25 Typically, the pH of the fragrance composition is from 2 to 10, particularly from 3.5 to 8, still more particularly from 4 to 7. If the pH is too low or too high, degradation of the microcapsules may take place, or the electric charge of the stabilizing polymers and/or suspending agents may not be suitable for effectively stabilizing the fragrance composition against phase separation.

With regard to the encapsulated fragrance, there are different types of known microcapsules, all of
30 which are useful in the present invention. However, preferably the microcapsules are in the form of so-called "core-shell" microcapsules, consisting of a core containing a fragrance ingredient or mixture thereof, and any other benefit agent that is desirable, such as cosmetic active ingredients, dyestuffs or the like, and a shell that surrounds the core.

Microcapsules may be characterized by a volume-weighted median diameter from about 0.5 micrometers to about 100 micrometers, particularly from 5 to 60 micrometers, still more particularly from 10 to 50 micrometers as measured by light scattering. The static light scattering method used for measuring the volume median diameter $D_v(50)$ of the microcapsules in step involves laser

5 diffraction particle size analysis and the Mie scattering theory. The principle of the Mie theory and how static light scattering can be used to measure the mean and median diameters of a plurality of particles having a distribution of sizes can be found, for example in H. C. van de Hulst, Light scattering by small particles. Dover, New York, 1981. The volume median diameter $D_v(50)$ may be calculated by using the software provided with the light scattering measurement apparatus.

10 Microcapsules may be characterized by a mean core to shell weight ratio of at least about 80 to 20, at least about 85 to 15, at least about 90 to 10, at least about 95 to 5, at least about 98 to 2, or at least about 99 to 1.

As used herein, a core-shell weight ratio refers to the ratio of weight percent based on the total weight of the microcapsule of core material to shell material. High core to shell material ratios can

15 advantageously result in highly efficient encapsulates having a high content of fragrance or other benefit agent per microcapsule. This can allow for high microcapsule loading of a fragrance composition according to the invention.

Microcapsule shells preferably comprise a polymeric material, which may be selected from aminoplast resins, such as resins formed from the reaction of formaldehyde or glyoxal with

20 melamine, urea and guanidine; polyurea resins, such as resins formed the polyaddition of polyfunctional isocyanates and polyfunctional amines, more particularly with polyethylenimine; terpolymers derived polyamine, polyol; and substituted methylene moieties; polyurethane resins, such as resins formed the polyaddition of polyfunctional isocyanates and polyfunctional alcohols; polyacrylic acid and polymetacrylic acid and their esters; polyamides; polysiloxanes; styrene and/or

25 ethylene maleic anhydride copolymers; polysaccharides, such as gum Arabic, pectins, and carboxymethylcellulose and proteins, such as gelatin and pea proteins; and combinations thereof.

In one embodiment, the shell of the microcapsules comprises a melamine-formaldehyde polymer, an urea-formaldehyde polymer, a polyurea or polyurethane polymer, a polyamide, a polyacrylate, a polycarbonate, a polymeric stabilizer that is formed by combination of a polymeric surfactant with at

30 least one aminosilane, a complex coacervate formed by cross-linking of at least one protein with a first cross-linking agent and at least one polysaccharide, or a hydrated polymer and a polymeric stabilizer formed by reaction of an aminosilane with a polyfunctional isocyanate, preferably wherein

the shell of the microcapsules is a hydrated polymer and a polymeric stabilizer formed by reaction of an aminosilane with a polyfunctional isocyanate.

In one embodiment, the core-shell microcapsules may be as described in WO 2023/020883A1.

Microcapsules may be coated, for example on an outer surface of the shell, with a deposition aid, such as a cationic polymer, a non-ionic polymer, an anionic polymer, or mixtures thereof. Suitable polymers may be selected from the group consisting of: polyvinylformaldehyde, partially hydroxylated polyvinylformaldehyde, polyvinylamine, polyethyleneimine, ethoxylated polyethyleneimine, cationic polysaccharides, such as chitosan and cationic guar gums, non-ionic polysaccharides, such as hyperbranched glycogene and locust bean gum; polyvinylalcohol, anionic polysaccharide, polyacrylates, and combinations thereof. The deposition aid may also have the function of suspending agents.

Microcapsule core material may comprise one or more fragrance ingredients. The core may comprise a mixture of at least 3, or even at least 5, or at least 7 or more fragrance ingredients. A mixture of fragrance ingredients may provide more complex and desirable aesthetics, and/or better fragrance performance or longevity, for example at a variety of touchpoints. However, it may also be desirable to limit the number of fragrance ingredients to reduce or limit formulation complexity and/or cost.

Microcapsule core material may comprise from about 1 wt.% to 100 wt.% of fragrance ingredients, based on the total weight of the core. Preferably, the core can include 50 wt.% to 100 wt.% fragrance ingredients based on the total weight of the core, more preferably 80 wt.% to 100 wt.% fragrance ingredients based on the total weight of the core.

As stated above, microcapsules may also encapsulate other fragrance excipients commonly used in perfumery, such as common perfumery solvents, extenders and the like, such as vegetable oil, modified vegetable oil, mono-, di-, and tri-esters of C4-C24 fatty acids, isopropyl myristate, dodecanophenone, lauryl laurate, methyl behenate, methyl laurate, methyl palmitate, methyl stearate, and mixtures thereof, preferably isopropyl myristate. Microcapsules may also contain other benefit agents, such as cosmetic active ingredients, dyestuffs and the like.

Microcapsules are useful to deliver fragrance to a fabric during or after laundry operations. Typical fragrance ingredients useful in the present invention have a molecular weight of at least about 100 g/mol. Fragrance ingredients fall into general chemical taxonomies, such as alcohols, ketones, aldehydes, esters, ethers, nitrites and alkenes, such as terpenes. Common fragrance ingredients useful in the present invention are described in various reference sources, for example, "Perfume and Flavor Chemicals", Vols. I and II; Steffen Arctander Allured Pub. Co. (1994) and "Perfumes: Art, Science and Technology", Miller, P. M. and Lamparsky, D., Blackie Academic and Professional (1994).

The fragrance ingredients useful in the present invention also include so-called "pro-perfumes". Sometimes pro-perfumes are also referred to as pro-fragrances or fragrance precursors. Whatever their nomenclature, they typically comprise a covalent bond between a carrier residue and a residue of one or more perfume raw materials. The one or more fragrance ingredients are released upon exposure to a trigger, such as water, light, heat or other environmental trigger which breaks the bond, for example by hydrolysis. Pro-perfume can modulate the release profiles of fragrance ingredients, resulting in long-lasting freshness benefits. Furthermore, because the total amount of fragrance ingredient is not released or otherwise available at one time, the olfactory impact of the ingredient is moderated.

When the fragrance composition according to the present invention contains neat fragrance, any of the fragrance ingredients or excipients referred to herein above can be used equally and independently in both encapsulated fragrance and in neat fragrance.

The neat fragrance and the encapsulated fragrances may be similar or different in terms of odor characteristics.

As mentioned herein above, the aqueous suspending medium of the fragrance composition typically comprises stabilizing polymers and suspending agents. The stabilizing polymers typically originate from the early stage of microencapsulation process, where these stabilizing polymers are used to disperse fragrance in the aqueous suspending medium and act as a microencapsulation templating agent prior to the formation of the microcapsules. Residual amounts of these stabilizing polymers may be present in the aqueous suspending medium after the microcapsules have been formed.

Stabilizing polymers include acrylic copolymers, more particularly acrylic acid/acrylate cross-polymer, such as those available under the trade mark Carbopol (ex Lubrizol), acrylic copolymers bearing sulfonate groups, such as those available commercially under the trade mark LUPASOL (ex BASF), such as LUPASOL PA 140 or LUPASOL VFR; copolymers of acrylamide and acrylic acid, copolymers of alkyl acrylates and N-vinylpyrrolidone, such as those available under the trade mark Luviskol (e.g. LUVISKOL K 15, K 30 or K 90 ex BASF); sodium polycarboxylates (ex Polyscience Inc.) or sodium poly(styrene sulfonate) (ex Polyscience Inc.); vinyl and methyl vinyl ether - maleic anhydride copolymers (e.g. AGRIMER™ VEMA™ AN, ex ISP) and ethylene, isobutylene or styrene-maleic anhydride copolymers (e.g. ZEMAC™); cationic polymers, more particularly polyampholytes; polyvinylpyrrolidone; poly(vinyl alcohol-co-acetate), such as those available under the trade mark Mowiol (ex. Kuraray); polysaccharides, such as carboxymethylcellulose, hydroxypropylcellulose, hydrophobically modified starch, pectins, and gum Arabic; and proteins, such as gelatin; and combinations thereof.

In embodiments of the invention, the amount of stabilizing polymers in the fragrance composition is from 0.1 wt.-% to 5 wt.-%, preferably from 0.5 to 2.5 wt.-%, based on the total weight of the composition.

In embodiments of the invention, the fragrance compositions comprise a suspending agent.

5 Suspending agents are commonly employed in slurries of microcapsules to keep the microcapsules stably suspended in an aqueous suspending medium.

The suspending agent may be any of those known in the art for suspending microcapsules in aqueous slurries.

10 In more particular embodiments, the suspending agent comprises a poly((meth)acrylic acid-co-alkyl (meth)acrylate) cross-polymer or a polysaccharide, or a combination thereof, preferably a polysaccharide.

Such polysaccharides include hydroxyethylcellulose, hydroxypropyl cellulose, hydroxypropylmethylcellulose, xanthan gum, bacterial derived celluloses, such as diutan gum, and combinations thereof. Besides their excellent suspending power, the advantage of such suspending agents is that they are not only fully bio-sourced, but also biodegradable. Wood-derived cellulose, such as micro-fibrillated cellulose may also be used.

15 In embodiments of the invention, the amount of suspending agent in the fragrance composition is from 0.005 wt.-% to 1 wt.-%, preferably from 0.05 wt.-% to 0.5 wt.-%, based on the total weight of the composition.

20 In particular embodiments, the composition may comprise two or more different encapsulated fragrances, more particularly fragrances having different odor characteristics.

The invention is concerned in its second aspect with a method of treating a fabric, the method comprising the step of applying to the fabric a fragrance composition as described herein.

25 The fragrance composition may be applied directly to a fabric, for example by spraying onto a fabric surface from a suitable container. However, the fragrance composition is preferably intended to be used to impart a fragrance onto a fabric during a laundry operation, and so can be added to a washing machine compartment and thereafter onto the fabric.

In particular embodiments of the invention, the fragrance composition is presented in a washing machine during a washing or conditioning operation.

30 In particular embodiments, the fragrance composition is separately presented to a washing machine in a discrete fabric treatment operation, which nevertheless may be simultaneously or sequentially

presented to a washing machine in a washing or conditioning operation in a time-spaced interval with one or more other separate and discrete additional fabric treatment products containing adjunct active ingredients, such as detergents or fabric conditioners.

5 In particular embodiments, the additional fabric treatment product is a detergent, a fabric conditioner, or combinations thereof.

The fragrance composition can be added to a washing machine during any stage of a washing or conditioning cycle. That is, it can be added before washing begins, during the time washing and/or conditioning steps are undertaken, or after washing or conditioning steps are undertaken.

10 In embodiments of the invention there is provided a method of treating a fabric with a fragrance composition, the method comprising the steps of:

- cleaning the fabric
- optionally conditioning the fabric; and
- adding the fragrance composition to the cleaned and optionally conditioned fabric.

15 In particular embodiments, the fragrance composition is added to the fabric conditioner dispensing compartment in a washing machine, such that the composition is entrained into the rinse cycle of the washing cycle.

Owing to the high concentration of encapsulated fragrance and optionally neat fragrance employed in fragrance compositions according to the invention, the composition can be dosed in relatively compacted amounts.

20 In particular embodiments, in a fabric treatment operation, the fragrance composition may be applied to the fabric in an amount that is from about 0.1 g to about 5 g, and more particularly 0.4 g to about 3 g of fragrance composition in a treatment.

The fragrance composition may be formulated and dosed in an amount so as to provide from about 0.02 g to about 3.5 g, more particularly from 0.1 g to 2.0 g of total fragrance per dose.

25 In embodiments of the invention, the fragrance composition may be added to the fabric conditioner dispensing drawer in a washing machine, such that the composition is entrained into the rinse cycle of the laundering process. The dose may be poured, pumped or sprayed into the drawer.

30 In embodiments of the invention, the fragrance composition may be included in a water-soluble container that dissolves in water and that can be directly placed into the fabric load in a wash machine. The water-soluble container may be designed such that it remains insoluble during the whole wash cycle and dissolves during the rinse cycle of the laundering process. Water-soluble

containers of that kind are well-known to the art and typically consists of single dose or pouches comprising the composition to be dispensed and a water-soluble film surrounding this composition. Suitable water-soluble films include modified poly(vinylalcohol) and/or cellulose-based polymers.

In particular embodiments the method comprises a step of contacting the fabric with the fragrance composition in a wash cycle, optionally in time-spaced intervals with a separate detergent composition and/or a fabric conditioner composition.

When a fabric is treated with a detergent composition in a wash cycle, the step of contacting the fabric with the fragrance composition according to the present disclosure may occur concurrently in the cleaning cycle or in a rinse cycle that follows the cleaning cycle. For purposes of the present disclosure, cleaning, rinsing, and/or treating can include, but is not limited to acts of scrubbing and mechanical agitation.

The treatment method may occur in any suitable automatic washing machine, for example at top-loader or a front-loader. Drying the treated fabric indoors may occur in a machine dryer, a form of actively drying the fabric. Drying the fabric indoors may also or alternatively comprise the step of hanging the clothes on a line or a rack, or otherwise passively drying the fabric.

The fabric may comprise any fabric capable of being laundered or treated in normal consumer use conditions. The fabric may comprise cotton fibers, polyester fibers, Lycra fibers, and wool.

In accordance with a third aspect of the invention the disclosure relates to the use of the fragrance composition as a fabric treatment composition, and more particularly as a scent booster, to provide an olfactory experience connoting a smell of freshness when it is applied to a fabric, and in particular a washed and/or conditioned fabric.

Accordingly, the invention relates to the fragrance composition as described herein above together with instructions for use by an end user as a scent booster in laundry care applications, that is together with instructions to add the fragrance composition directly or indirectly via a compartment in a washing machine to a washed or conditioned fabric.

Aqueous slurries containing a high concentration fragrance-containing microcapsules are known in the art. However, they are not known or utilized as consumer products and in particular scent boosters, as such. That is, they are utilized as component parts of other fabric treatment products, such as detergents and in particular fabric conditioners, in which they are present in such high dilution that the finished consumer product contains a relatively low concentration of encapsulated fragrance, which is in intimate admixture with adjunct laundry active ingredients, such as detergent and softener ingredients.

In the fourth aspect, the present invention provides a fabric treatment composition consisting essentially of the fragrance composition according to the first aspect of the invention, more particularly a scent booster.

5 In the fifth aspect of the invention the fabric treatment composition, and particularly a scent booster composition, in accordance with the third and fourth aspects of the invention is packaged in a container adapted for use by a consumer to dispense fragrance onto a fabric.

In particular embodiments, the fragrance is dispensed onto a fabric when the composition is added to a washing machine during a washing or conditioning operation.

10 In accordance with preferred embodiments of the invention the packaging in which the composition is contained is suitable to be handled by a consumer carrying out a laundry operation.

More particularly the packaging comprises a bottle that may be provided with a dispensing means enabling the consumer to meter in a uniform and consistent manner.

15 More particularly, the bottle may comprise a nozzle, optionally containing a pump spray for administering the composition, or a bottle with a dispensing means containing valve means for accurately metering a defined dose of composition.

In particular embodiments of the invention, the packaging contains instructions for end users to utilize the composition as a fabric treatment composition, and more particularly a scent booster composition, in a laundry operation. Still more particular, those instructions include directions to add the fragrance composition directly or indirectly via a compartment in a washing machine to a washed
20 or conditioned fabric.

The invention will be further illustrated by reference to the following examples.

Example 1: Preparation of microcapsule slurries

25 In Example 1.1, a slurry comprising cationic aminoplast microcapsules was obtained as described in EP 3 310 892 B1, Example 1, using 350 g of perfume composition instead of 300 g and 400 g water instead of 550 g. The solid content of the slurry was measured by using a thermo-balance operating at 120 °C. The solid content, expressed as weight percentage of the initial slurry deposited on the balance was taken at the point where the drying-induced rate of weight change had dropped below 0.1 wt %/min. The solid content was 42.3 wt %, based on the total weight of the slurry. The volume-weighted median diameter of the capsules was $Dv50=10\text{ }\mu\text{m}$.

30 In Example 1.2, a slurry comprising anionic aminoplast microcapsules was obtained as described in US 8,119,587 B2, Example 1.3, Process P5.1. The solid content, measured as described hereinabove, was 42 wt.%. The yield of encapsulation, expressed as the ratio of the encapsulated fragrance

composition divided by nominal amount of fragrance composition was 100%. The volume-weighted median diameter of the capsules was Dv50=13.6 µm.

In Example 1.3, a slurry comprising amphoteric aminoplast microcapsules was obtained as described in WO 2018/197266 A1, Example 3. The solid content, measured as described hereinabove, was 44 wt.%. The volume-weighted median diameter of the capsules was Dv50=17.5 µm.

In Example 1.4, a slurry comprising polyurea microcapsules was obtained as described in WO 2023/017014 A1, Example 1.2. The solid content, measured as described hereinabove, was 38.9 wt.%. The volume-weighted median diameter of the capsules was Dv50=14 µm.

In Example 1.5, a slurry comprising hydrated polymer phase and a polymeric stabilizer microcapsules comprising a hydrated polymer phase and a polymeric stabilizer was obtained as described in WO 2023/020883 A1, Example1. The solid content, measured as described hereinabove, was 32 wt.%. The volume-weighted median diameter of the capsules was Dv50=30 µm.

Example 2: Fragrance compositions and stability

A series of fragrance compositions were prepared, as reported in the Tables. In case a neat fragrance was admixed with the microcapsule slurry, this neat fragrance was simply added to the slurry at room temperature under stirring in a vessel equipped with a turbine, or a cross-beam Mig stirrer with pitched beam. The stirring speed was 630 rpm for example 1.1, 630 rpm for example 1.2, 480 rpm for example 1.3, 580 rpm for example 1.4 and 450 rpm for example 1.5.

The stability of the composition with respect to phase separation was assessed by using a Turbiscan AGS instrument after the slurries had been stored at 40 °C for two weeks. The assessment was performed at a temperature of 25 °C.

Table 1: Stability of fragrance compositions comprising cationic aminoplast microcapsules

Neat fragrance (wt.-%)	Free oil (g)	Slurry of sample 1.1 (g)	TSI value
0.0	0.0	700.0	8.6 (unstable, creaming)
1.0	7.1	693.8	7.2 (ditto)
2.0	14.1	685.7	6.9 (ditto)
3.0	21.1	678.7	6.2 (ditto)
4.0	28.2	671.5	6.6 (ditto)
5.0	35.1	664.7	5.3(stability limit, slow phase separation)

6.0	42.1	658.6	5.3 (stability limit, slow phase separation)
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Table 2: Stability of fragrance compositions comprising polyurea microcapsules

Neat fragrance (wt.-%)	Free oil (g)	Slurry of sample 1.3 (g)	TSI value
0.0	0.0	700.0	3.6
1.0	7.0	693.1	2.4
2.0	14.2	686.5	2.5
3.0	21.1	678.8	2.2
4.0	28.1	672.2	2
5.0	35.1	665.3	2.7
6.0	42.0	658.1	2.9

Table 3: Stability of fragrance compositions comprising ampholytic aminoplast microcapsules

Neat fragrance (wt.-%)	Free oil (g)	Slurry of sample 1.4 (g)	TSI value
0.0	0.0	700.0	1.5
1.0	7.0	694.0	1.5
2.0	14.2	686.1	1.6
3.0	21.1	679.3	1.5
4.0	28.1	672.1	2.1
5.0	35.1	666.6	2.2
6.0	42.0	659	1.9

5

Table 4: Stability of fragrance compositions comprising anionic aminoplast microcapsules

Neat fragrance (wt.-%)	Free oil (g)	Slurry of sample 1.3 (g)	TSI value
0.0	0.0	700.0	2.6

1.0	7.0	693.9	1.5
2.0	14.1	686.8	1.6
3.0	21.1	678.8	1.4
4.0	28.2	672.5	1.3
5.0	35.0	666.5	2.2
6.0	42.0	658.1	3.4

As apparent from Tables 1 to 5, admixing neat fragrance with microcapsule slurries at a level of 1 to 6 wt.% neat fragrance has no significant impact on the stability of the composition with respect to phase separation. Moreover, when admixed with slurry samples 1.1 (Table 1), the neat fragrance has even a stabilizing effect.

Example 3: Olfactive performance of the scent boosters

In Example 3.1.1 to 3.1.3, varying amounts of neat fragrance A were admixed with varying amounts of slurry sample 1.4 containing about 34 wt.% of encapsulated perfume B in polyurea microcapsules according to Example 1.4. In Example 3.1.1, no neat fragrance was used. In Example 3.1.2, 5 wt.% of neat oil was added and in Example 3.1.3, 10 wt.% of neat oil was added.

In Example 3.2.1 to 3.2.3, varying amounts of neat fragrance C were admixed with varying amounts of slurry sample 1.3 containing about 34 wt.% of encapsulated perfume D in ampholytic aminoplast microcapsules according to Example 1.3. In Example 3.2.1, no neat fragrance was used. In Example 3.2.2, 5 wt.% of neat oil was added and in Example 3.2.3, 10 wt.% of neat oil was added.

Perfume A, B, C and D were different in terms of odor characteristics.

The fragrance composition samples were stored for 1 month at 40 °C before use.

The two scent boosters 3.1 and 3.2 were sprayed directly onto the softener dispensing drawer of a front-loaded wash machine. 5 spritzes correspond to about 2g of scent booster.

1 kg terry towels were submitted to a rinse cycle in a front-loaded washing machine and 75 g of unperfumed liquid detergent at a temperature of 40 °C. The total volume of water was 20 L.

For this evaluation, the terry toweling was handled carefully in order to minimize the risk of breaking the microcapsules mechanically. The perfume intensity was measured on wet fabrics, just after having taken the fabrics out of the machine, and on dry towel, before and after gently rubbing the fabrics between two hands. The pre-rub and post-rub olfactive evaluation was performed after line

drying the terry toweling for 24 hours at room temperature. The olfactive performance (intensity) was assessed by a panel of 4 experts rating on a scale of 1-10 (2 = barely noticeable, 4 = weak, 6 = medium, 8 = strong and 10 = very strong).

The results are reported on Tables 5 and 6.

5 Table 5: Olfactive performance of selected fragrance compositions containing polyurea microcapsules after laundering. The reported numbers are fragrance intensities. The amount of fragrance composition provided was 2 g.

	Wet	Pre-rub	Post-rub
Example 3.1.1 (no neat fragrance)	7.5	6	9
Example 3.1.2 (5 wt.% neat fragrance)	7.8	5.8	8.6
Example 3.1.3 (10 wt.% neat fragrance)	8	5.6	8.1

10 Table 6: Olfactive performance of selected fragrance compositions containing ampholytic aminoplast microcapsules after laundering. The reported numbers are fragrance intensities. The amount of fragrance composition provided was 2 g.

	Wet	Pre-rub	Post-rub
Example 3.2.1 (no neat fragrance)	7	3.2	5.8
Example 3.2.2 (5 wt.% neat fragrance)	7	3.6	6.1
Example 3.2.3 (10 wt.% neat fragrance)	7	3.8	6.3

Example 4: Comparative examples

15 The performance results of Example 3 obtained after applying 5 spritzes (2g) of fragrance composition to the laundering process were compared to performance results obtained by applying recommended amounts of comparative commercial products. The results are reported on Table 7.

The viscosity of the four compositions has been measured by using a Hacke rheometer equipped with a cone-plate measuring unit P60 Ti-L operating at a shear rate of 21 s⁻¹ and a temperature of 25 °C.

20 Table 7: Comparison between fragrance compositions according to the present invention and two commercial products. The reported numbers are fragrance intensities.

	Wet	Pre-rub	Post-rub	Viscosity [mPas]
5 spritzes (about 2 g) of composition 3.1.2	7.8	5.8	8.6	381
5 spritzes (about 2 g) of composition 3.2.2	7	3.6	6.1	444
Commercial product 1 (20 g)	8	5	1.5	125
Commercial product 2 (13 g)	5	2.5	1	180

As apparent from Table 7, the fragrance compositions according to the present invention are dosed in a much lower amount compared to the comparative products but perform at least as well as these comparative products on wet fabrics. The fragrance compositions according to the present invention provides significantly better post-rub performance than the comparative products. Moreover, owing to their higher viscosity, the fragrance composition according to the present invention are less prone to undesirable spillage when pouring or spraying the composition.

Example 5: Deposition of fragrance on fabric

A perfume deposition study was carried out on 100 % cotton fabric using

- a) 5 spritzes (2g) of a scent booster prepared according to the invention, by mixing 95% of a slurry containing about 34 wt.% of encapsulated perfume in anionic aminoplast microcapsules (obtained as described in US 8,119,587 B2) and 5% of neat fragrance D; and
- b) a polyethylene-glycol based commercial reference scent booster, applied in the recommended amount .

The samples, each consisting of two 100 % cotton T-shirts, were washed in a front loading European washing machine Miele.

The scent booster composition was applied to the washing samples in the following manner:

- a) the scentbooster according to the invention was added into the fabric softener drawer i.e. in the rinse cycle;

- b) the commercial reference was added into the drum at the beginning of the wash cycle.

Analysis of fragrance deposition was carried out on each T-shirt on each of the two arms: A first arm on wet, freshly laundered shirts, and a second arm on the shirts that had been dried for 4 days.

Each arm was subjected to extraction using dichloromethane with a Buchi SpeedExtractor E-914, to measure the amount of perfume deposited on the sample. Methyl decanoate (50 microlitre of

10'000 ppm solution in hexane) was used as a reference standard. Extracts obtained from each arm

were injected in accordance with the splitless method in a GC/MS/FID (Agilent GC 6890 / MS5975 – FID Non-POLAR - Rxi5-ms) for perfume detection and quantification using the reference standard.

5 For the wet sample, the amount of fragrance recovered from the scent booster according to the invention was 242 micrograms perfume/gram of sample. By comparison, the commercial reference value was 36 micrograms/gram.

For the dry sample, the amount of fragrance recovered from the scent booster according to the invention was 124 micrograms perfume/gram of sample. By comparison, the commercial reference value was 13 micrograms/gram.

10 The results demonstrate superior perfume retention on cotton fabric treated with the scent booster according to the invention compared with a commercial reference composition.

We Claim

1. A fragrance composition comprising a plurality of microcapsules encapsulating a benefit agent suspended in an aqueous suspending medium, wherein the composition is free or substantially free of surfactant.
- 5 2. The fragrance composition according to claim 1, wherein the composition is free or substantially free of anionic surfactants, cationic surfactants, non-ionic surfactants, zwitterionic surfactants or betaines, having typically a molecular weight of 2000 g/mol or less, more particularly 1000 g/l or less, or any mixtures thereof.
- 10 3. The fragrance composition according to claim 1 or 2, wherein the microcapsules are present in an amount of from 20 wt.% to 60 wt.%, more particularly from 30 wt.% to 50 wt.%, based on the total weight of the fragrance composition.
4. The fragrance composition according to any of the preceding claims additionally comprising a neat fragrance dispersed or dissolved in the in the aqueous suspending medium.
- 15 5. The fragrance composition according to any of the preceding claims, wherein the neat fragrance is present in an amount of from 1 wt.% to 20 wt.%, more particularly from 2 wt.% to 15 wt.%, still more particularly from 3 wt.% to 12 wt.%, for example 5 wt.% or 10 wt.% of neat fragrance, based on the total weight of the composition.
6. The fragrance composition according to any of the preceding claims wherein the aqueous suspending medium comprises a suspending agent.
- 20 7. The fragrance composition according to any of the preceding claims wherein the suspending agent is a polysaccharide, selected from the group consisting of hydroxyethylcellulose, a hydroxypropyl cellulose, a hydroxypropylmethyl cellulose, xanthan gum, a diutan gum, a bacterial micro fibrillated cellulose, and combinations thereof.
- 25 8. The fragrance composition according to any of claims 6 or 7, wherein the amount of suspending agent in the fragrance composition is from 0.005 wt.-% to 1 wt.-%, preferably from 0.05 wt.-% to 0.5 wt.-%, based on the total weight of the composition.
9. A method of treating a fabric, optionally a washed fabric, the method comprising the step of applying to the fabric a fragrance composition according to any of the claims 1 through 8.
- 30 10. The method according to claim 9 wherein the fragrance composition is applied to a fabric in a washing machine during or after a washing or conditioning operation.

11. The method according to claim 9 or claim 10 wherein the fragrance composition is added to a washing machine in a fabric treatment operation, and in a separate step one or more additional fabric treatment products containing washing detergents, fabric conditioners or mixtures thereof are added to the washing machine in simultaneous or sequential time-spaced intervals.

12. A method according to any of the claims 9 through 11 comprising the steps of:

- cleaning the fabric;
- optionally conditioning the fabric; and
- adding the fragrance composition according to any of the claims 1 through 7 to the cleaned and optionally conditioned fabric.

13. The use of the fragrance composition according to claim 1 through 8 as a scent booster to provide an olfactory experience connoting a smell of freshness when applied to a fabric.

14. A scent booster consisting essentially of a fragrance composition according to claims 1 through 8 in a container provided with dispensing means enabling a consumer to meter uniform and consistent dose of fragrance composition.

15. A scent booster according to claim 14 additionally containing instructions to the end user to add the fragrance composition to a washed or conditioned fabric either directly or indirectly via a compartment in a washing machine.