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(54) **SMOKING ARTICLE FILTER AND SMOKING ARTICLE INCLUDING THE SAME**

(57) A smoking article filter and a smoking article including the same are provided. The smoking article filter includes filter tow including regenerated cellulose

fibers, a flavoring dispersed in the filter tow, and a functional additive dispersed in the filter tow.

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Description

[Technical Field]

- 5 **[0001]** The present invention relates to a smoking article filter and a smoking article including the same, and more particularly, to a smoking article filter and a smoking article including the same in which an additive is added to increase the persisting amount of flavoring in a biodegradable filter and the transfer amount of flavoring during smoking.

10 [Background Art]

[0002] Cellulose acetate (CA) tow is a material made by reacting sulfuric acid and acetic acid with cellulose and is a material that has undergone chemical modification. The CA tow used in manufacturing existing cigarette filters improves the hardness of a filter with a plasticizer applied thereto, and when a filter is manufactured using CA tow, a tow-to-tow binding force is enhanced in addition to the hardness being improved. However, a CA filter manufactured using

15 a plasticizer has a problem that it is difficult to meet analysis passing criteria such as industrial composting conditions. **[0003]** Meanwhile, lyocell tow (also referred to as "L-tow") is a material made in the form of a fiber bundle by melting cellulose in an eco-friendly solvent referred to as N-methylmorpholine N-oxide (NMMO) instead of modifying the structure of cellulose through a chemical reaction as in CA tow. Lyocell tow is an eco-friendly material containing

20 cellulose as its main component. **[0004]** Also, in recent years, research on a technology for adding various flavors and tastes during smoking has been carried out for smoking articles. For example, a transfer jet nozzle system (TINS) filter on which a flavoring is sprayed, a filter equipped with a capsule, tipping paper coated with a sweetener, etc., are utilized for filters constituting smoking articles.

25 **[0005]** Therefore, in filters constituting smoking articles, a need has emerged for development of a smoking article filter that has excellent biodegradability, allows persistence stability of a flavoring in filters to be secured in storage and distribution processes, allows the transfer amount of flavoring to be effectively delivered through the mouth of a user during smoking, and has excellent transfer continuity.

30 [Disclosure]

[Technical Problem]

[0006] The present invention is directed to providing a smoking article filter that has improved biodegradability due to being configured using lyocell tow having excellent biodegradability and a smoking article including the smoking article filter.

[0007] The present invention is also directed to providing a smoking article filter in which an additive (for example, polyethylene glycol) is dispersed in and added to lyocell tow together with a flavoring (for example, menthol), thereby having excellent persistence (or retention) of the flavoring in the filter and having an excellent transfer amount of the flavoring delivered through the mouth of a user during smoking, and a smoking article including the smoking article filter. Further, the present invention is directed to providing a smoking article filter in which a transfer amount of a flavoring can be uniformly maintained despite an increase in puff count and a smoking article including the smoking article filter.

40 **[0008]** The present invention is also directed to providing a smoking article filter in which an additive (for example, polyethylene glycol) is added at an optimum amount to lyocell tow together with a flavoring (for example, menthol), thereby minimizing problems such as wetting of a wrapper, with which the lyocell tow is wrapped, due to the flavoring and the additive, bursting of the lyocell tow due to the lyocell tow not being stably fixed, or set-off of ink, and a smoking article including the smoking article filter.

50 **[0009]** However, objectives of the present invention are not limited to those mentioned above, and other unmentioned objectives should be clearly understood by those of ordinary skill in the art to which the present invention pertains based on the description below.

[Technical Solution]

55 **[0010]** One embodiment for achieving the above objectives provides a smoking article filter including filter tow including regenerated cellulose fibers, a flavoring dispersed in the filter tow, and a functional additive dispersed in the filter tow.

[0011] In some embodiments, the regenerated cellulose fibers may include at least one or more of lyocell fibers,

viscose fibers, and modal fibers.

[0012] In some embodiments, the regenerated cellulose fibers may consist of lyocell fibers, and the filter tow may consist of lyocell tow.

[0013] In some embodiments, the regenerated cellulose fibers may be lyocell fibers, and the filter tow may be lyocell tow.

[0014] In some embodiments, the flavoring may be a flavor liquid including a flavor component.

[0015] In some embodiments, the flavor liquid may include menthol, and the total content of the flavor liquid included in the smoking article filter may be 1.0 mg or more and 30.0 mg or less.

[0016] In some embodiments, the functional additive may include one or more selected from the group consisting of polyethylene glycol (PEG), triethyl citrate (TEC), ethylene glycol oligomers, ethylene glycol oligomer ether derivatives which are ether derivatives of the ethylene glycol oligomers, propylene glycol oligomers, and propylene glycol oligomer ether derivatives which are ether derivatives of the propylene glycol oligomers.

[0017] In some embodiments, the ethylene glycol oligomers may include at least one or more of diethylene glycol (DEG), triethylene glycol (TEG), tetraethylene glycol (TetraEG), and pentaethylene glycol (PentaEG), and the propylene glycol oligomers may include at least one or more of dipropylene glycol (DPG), tripropylene glycol (TPG), tetrapropylene glycol (TetraPG), and pentapropylene glycol (PentaPG).

[0018] In some embodiments, the functional additive may include polyethylene glycol (PEG) and triethyl citrate (TEC), and a mixing ratio of the triethyl citrate (TEC) and polyethylene glycol (PEG) may range from 1:9 to 9:1.

[0019] In some embodiments, the total content of the functional additive dispersed in the filter tow may be 1.0 mg or more and 25.0 mg or less.

[0020] In some embodiments, the total content of the functional additive dispersed in the filter tow may be 0.05 mg/mm or more and 0.85 mg/mm or less.

[0021] Another embodiment for achieving the above objectives provides a smoking article including a smoking material portion and a filter portion disposed downstream of the smoking material portion, wherein the filter portion includes lyocell tow made of lyocell fibers, a flavor liquid dispersed in the lyocell tow, a functional additive dispersed in the lyocell tow, and a wrapper surrounding the lyocell tow, and the wrapper may be hard wrapping paper having a basis weight of 40 gsm or more.

[Advantageous Effects]

[0022] According to a smoking article filter and a smoking article including the same according to one embodiment, since an additive (for example, polyethylene glycol) is dispersed in lyocell tow to which a flavoring (for example, menthol) is applied, not only persistence (or retention) of the flavoring in the filter, but also a transfer amount of the flavoring delivered through the mouth of a user during smoking is excellent. Further, the transfer amount of the flavoring can be uniformly maintained despite an increase in puff count.

[0023] Also, according to a smoking article filter and a smoking article including the same according to one embodiment, since an additive (for example, polyethylene glycol) is added at an optimum amount to lyocell tow together with a flavoring (for example, menthol), it is possible to minimize problems such as wetting of a wrapper, with which the lyocell tow is wrapped, due to the flavoring and the additive, bursting of the lyocell tow due to the lyocell tow not being stably fixed, or set-off of ink.

[0024] The effects of the present invention are not limited to the foregoing effects, and it shall be understood that the effects of the present invention include all of the effects inferable from the detailed description of the present invention or the configuration of the invention described in the claims.

[Description of Drawings]

[0025]

FIG. 1 is a schematic perspective view of a smoking article according to one embodiment.

FIG. 2 is a graph showing results of measuring the amount of flavoring persisting in a smoking article filter portion according to the storage period of smoking articles including filters according to Example 1 and Comparative Examples 1 and 2.

FIG. 3 is a graph showing results of measuring a transfer amount of flavoring according to the storage period of smoking articles including filters according to Example 1 and Comparative Examples 1 and 2.

FIG. 4 is a graph showing results of measuring a transfer amount of flavoring per puff of smoking articles including filters according to Example 2 and Comparative Examples 3 and 4.

[Modes of the Invention]

[0026] Hereinafter, exemplary embodiments of the present disclosure will be described in detail with reference to the accompanying drawings. Advantages and features of the present disclosure and methods of achieving the same should become clear with embodiments described in detail below with reference to the accompanying drawings. However, the technical spirit of the present disclosure is not limited to the following embodiments and may be implemented in various different forms. The following embodiments are only provided to make the technical spirit of the present disclosure complete and completely inform those of ordinary skill in the art to which the present disclosure pertains of the scope of the present disclosure. The technical spirit of the present disclosure is defined only by the scope of the claims.

[0027] In assigning reference numerals to components of each drawing, it should be noted that the same reference numerals are assigned to the same components wherever possible even when the components are illustrated in different drawings. Also, in describing the present disclosure, when it is determined that the detailed description of a known related configuration or function may obscure the gist of the present disclosure, the detailed description thereof will be omitted.

[0028] Unless otherwise defined, all terms including technical or scientific terms used herein have the same meaning as commonly understood by those of ordinary skill in the art to which the present disclosure pertains. Terms defined in commonly used dictionaries should not be interpreted in an idealized or overly formal sense unless expressly so defined herein. Terms used herein are for describing the embodiments and are not intended to limit the present disclosure. In the specification, a singular expression includes a plural expression unless the context clearly indicates otherwise.

[0029] Also, in describing components of the present disclosure, terms such as "first," "second," "A," "B," "(a)," and "(b)" may be used. Such terms are only used for distinguishing one component from another component, and the essence, order, sequence, or the like of the corresponding components is not limited by the terms. In a case in which a certain component is described as being "connected," "coupled," or "linked" to another component, it should be understood that, although the component may be directly connected or linked to the other component, still another component may also be "connected," "coupled," or "linked" between the two components.

[0030] The terms "comprises," "comprising," "contain," "containing," "include," "including," "have" and/or "having" used herein do not preclude the presence or addition of one or more components, steps, operations, and/or devices other than those mentioned.

[0031] Further, unless expressly stated to the contrary, "or" refers to an inclusive or and not to an exclusive or. For example, a condition A or B is satisfied by any one of the following: A is true (or present) and B is false (or not present), A is false (or not present) and B is true (or present), and both A and B are true (or present).

[0032] The use of the term "at least one" or "one or more" will be understood to include one as well as any quantity more than one. In addition, the use of the phrase "at least one of X, Y, and Z" will be understood to include X alone, Y alone, and Z alone, as well as any combination of X, Y, and Z.

[0033] As used herein any reference to "one embodiment" or "an embodiment" means that a particular element, feature, structure, or characteristic described in connection with the embodiment is included in at least one embodiment. The appearances of the phrase "in one embodiment" in various places in the specification are not necessarily all referring to the same embodiment.

[0034] First, some terms used herein will be clarified.

[0035] In the present specification, "smoking article" may refer to any product that can be smoked or any product that can provide a smoking experience, regardless of whether the product is based on tobacco, tobacco derivatives, expanded tobacco, reconstituted tobacco, or tobacco substitutes. For example, smoking articles may include products that can be smoked, such as cigarettes, cigars, and cigarillos.

[0036] In the present specification, "smoking material" may refer to any type of material that may be used in a smoking article.

[0037] In the present specification, "filter portion" refers to a component including a filtering material. For example, a filter element may include a plurality of fiber strands.

[0038] In the present specification, "upstream" or "upstream direction" may refer to a direction away from the mouth of a smoker, and "downstream" or "downstream direction" may refer to a direction toward the mouth of the smoker.

[0039] In the present specification, "longitudinal direction" may refer to a direction corresponding to a longitudinal axis of a smoking article. The "longitudinal axis" of a smoking article may refer to a virtual line extending in the main longitudinal direction of the smoking article. This axis usually continues from one side end (e.g., a mouthpiece or filter end) of a smoking article to the other side end (e.g., a combustion or heat source end).

[0040] In the present specification, "regenerated cellulose filter" refers to a filter including regenerated cellulose tow or made of regenerated cellulose tow.

[0041] In the present specification, "lyocell filter" refers to a filter including lyocell tow or made of lyocell tow.

[0042] In the present specification, "viscose filter" refers to a filter including viscose tow or made of viscose tow.

[0043] In the present specification, "modal filter" refers to a filter including modal tow or consisting of modal tow.

[0044] In the present specification, "regenerated cellulose tow" includes a plurality of regenerated cellulose-based fibers or consists of a plurality of regenerated cellulose-based fibers. In some embodiments, regenerated cellulose tow

[0045] In the present specification, "lyocell tow" includes a plurality of lyocell fibers or consists of a plurality of lyocell fibers. In some embodiments, lyocell tow may be a bundle formed by cross-linking adjacent lyocell fibers.

[0046] In the present specification, "viscose tow" includes a plurality of viscose fibers or consists of a plurality of viscose fibers. In some embodiments, viscose tow may be a bundle formed by cross-linking adjacent viscose fibers.

[0047] In the present specification, "modal tow" includes a plurality of modal fibers or consists of a plurality of modal fibers. In some embodiments, modal tow may be a bundle formed by cross-linking adjacent modal fibers.

[0048] In the present specification, "regenerated cellulose fibers" may refer to cellulose-based fibers formed by processing a naturally generated cellulose-based material.

[0049] In the present specification, "lyocell fibers", "viscose fibers" and "modal fibers" may refer to eco-friendly fibers made of cellulose extracted from wood pulp. Specifically, "lyocell fibers", "viscose fibers" and "modal fibers" may be fibers made of cellulose derived, or mainly derived, from wood pulp.

[0050] In the present specification, "non-circular cross-section" is defined as a cross-section having a shape including a plurality of protrusions instead of having a circular shape. For example, a cross-section having a shape in which a plurality of protrusions branch and/or extend from the center and/or the center of the cross-section may be referred to as "non-circular cross-section." Here, "protrusions" may refer to distinct, extended segments or arms extending outward from a central core or a joining point of a cross-section of a regenerated cellulose-based fiber (preferably, a lyocell fiber).

[0051] In some embodiments, a regenerated cellulose-based fiber (preferably, a lyocell fiber) may have a Y-shaped cross-section with three protrusions branching and/or extending from the center and/or the center of the cross-section, a cross-shaped cross-section with four protrusions, a star-shaped cross-section with five or more protrusions, or an O-shaped cross-section, but the present disclosure is not limited thereto.

[0052] In some embodiments, a regenerated cellulose-based fiber (preferably, a lyocell fiber) may include three or more protrusions branching and/or extending from the center and/or the center of the cross-section.

[0053] In some embodiments, a regenerated cellulose-based fiber (preferably, a lyocell fiber) included in regenerated cellulose tow (preferably, lyocell tow) may have a Y-shaped cross-section in terms of its intended use for application to smoking article filters.

[0054] In the present specification, "consisting of" a certain component may mean being made of the corresponding component.

[0055] In the present specification, a wrapper (for example, wrapping paper) may surround at least a portion of a surface around a longitudinal axis of each portion and/or structure of a smoking article.

[0056] In the present specification, "basis weight" refers to a mass per unit area of wrapping paper and/or a wrapper. A basis weight of wrapping paper and/or a wrapper may be determined by measuring the mass and area of the wrapping paper and/or wrapper and dividing the mass of the wrapping paper and/or wrapper by the area thereof. The unit of the basis weight may be grams per square meter (gsm), i.e., g/m².

[0057] In the present specification, "hard wrapping paper" may refer to wrapping paper having a basis weight of a predetermined value or more, and "general hard wrapping paper" may refer to wrapping paper whose surface is not treated to be grease-resistant.

[0058] In some embodiments, "grease-resistant wrapping paper" may refer to wrapping paper whose surface is treated to be grease-resistant, and "grease-resistant hard wrapping paper" may refer to hard wrapping paper whose surface is treated to be grease-resistant.

[0059] In some embodiments, "general wrapping paper" may refer to wrapping paper whose surface is not treated to be grease-resistant, and "general hard wrapping paper" may refer to hard wrapping paper whose surface is not treated to be grease-resistant.

[0060] In the present specification, the "mono denier" of regenerated cellulose tow (preferably, lyocell tow) refers to the denier of one strand of monofilament separated from a multifilament of regenerated cellulose-based fibers (preferably, lyocell fibers) constituting the regenerated cellulose tow (preferably, lyocell tow).

[0061] In the present specification, the "total denier" of regenerated cellulose tow (preferably, lyocell tow) refers to the denier of a multifilament of regenerated cellulose-based fibers (preferably, lyocell fibers) constituting the regenerated cellulose tow (preferably, lyocell tow).

[0062] In the present specification, "resistance to draw" refers to a static pressure difference between both ends of a sample when an airflow passes through the sample. For example, resistance to draw may be measured using the method specified in ISO Standard 6565:2015. According to ISO Standard 6565:2015, resistance to draw may refer to a static pressure difference between both ends of a sample when an airflow passes through the sample under normal

conditions where a volumetric flow rate is 17.5 mm/s at a discharge end (a temperature of 22 ± 2 °C and a relative humidity of $60 \pm 5\%$).

[0063] In the present specification, "puff" refers to the action of inhaling or drawing air through a smoking article to produce and inhale smoke or vapor. "Puff count" may refer to an accumulated number of inhaling or drawing actions during use of the smoking article.

[0064] In the present specification, the unit "mmWG" is a unit of pressure and means "mmH₂O."

[0065] Hereinafter, various embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

[0066] FIG. 1 is a schematic perspective view of a smoking article according to one embodiment.

[0067] Throughout the specification, "smoking article" may refer to anything capable of generating an aerosol, such as tobacco (cigarettes) and cigars. The smoking article may include an aerosol-generating material and/or an aerosol-forming substrate. Also, the smoking article may include a solid material based on tobacco raw materials, such as reconstituted tobacco leaves, cut tobacco, and reconstituted tobacco. A smoking material may include volatile compounds.

[0068] Referring to FIG. 1, a smoking article 100 includes a smoking material portion 10 and a filter portion 20 disposed downstream of the smoking material portion 10. The smoking article 100 may further include a smoking material portion wrapper 30a, a filter portion wrapper 30b, and tipping paper 40. A smoking article filter according to the present invention may include the filter portion 20 and the filter portion wrapper 30b surrounding the filter portion 20. The smoking material portion wrapper 30a and/or the filter portion wrapper 30b may each be located at an outermost side of the smoking article 100 and may each be a single wrapper or a combination of a plurality of wrappers.

[0069] Throughout the specification, "upstream" or "upstream direction" refers to a direction away from the mouth of a user (consumer) smoking the smoking article 100, and "downstream" or "downstream direction" refers to a direction toward the mouth of the user (consumer) smoking the smoking article 100. For example, in the smoking article 100 illustrated in FIG. 1, the smoking material portion 10 is disposed upstream or in an upstream direction of the filter portion 20 included in the smoking article filter.

[0070] Further, in the present specification, the smoking article 100 may be a combustion-type cigarette or a heating-type cigarette that is used together with an aerosol generation device such as an electronic cigarette device.

[0071] In some embodiments, the smoking material portion 10 may be filled with at least one or more of a tobacco material, a nicotine-containing material, and an aerosol-generating material. In some embodiments, the smoking material portion 10 may be filled with only one of the tobacco material, the nicotine-containing material, and the aerosol-generating material or may be filled with a mixture of two or more of the tobacco material, the nicotine-containing material, and the aerosol-generating material. In some embodiments, the smoking material portion 10 may be configured by one of the tobacco material and the nicotine-containing material being mixed with the aerosol-generating material at a predetermined ratio.

[0072] In some embodiments, the tobacco material may include a smoking material such as raw tobacco leaves, reconstituted tobacco leaves, or a mixture of tobacco leaves and reconstituted tobacco leaves. In some embodiments, a processed smoking material may be in the form of cut tobacco, tobacco particles, a tobacco sheet, tobacco beads, tobacco granules, tobacco powder, and/or a tobacco extract. In particular, for example, the tobacco material may include one or more of tobacco leaves, lateral veins of tobacco leaves, expanded tobacco, cut tobacco, cut reconstituted tobacco leaves, and reconstituted tobacco. In some embodiments, the smoking material portion 10 may be filled with the processed smoking material of various forms.

[0073] In some embodiments, a nicotine liquid composition may be adsorbed or contained in the nicotine-containing material. In some embodiments, the nicotine-containing material may be formulated in the form of any one of a granule, a tablet, and a sheet. In some embodiments, the smoking material portion 10 may be filled with the nicotine-containing material of various forms.

[0074] In some embodiments, the aerosol-generating material may include at least one of glycerin, propylene glycol, ethylene glycol, dipropylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, and oleyl alcohol, but the present disclosure is not limited thereto.

[0075] In some embodiments, the smoking material portion 10 may contain other additives such as a flavoring agent, a wetting agent, and/or an acetate compound. In some embodiments, the aerosol-generating material and/or the additives may be contained in the smoking material.

[0076] In some embodiments, the smoking material portion 10 may be wrapped with the smoking material portion wrapper 30a.

[0077] In some embodiments, the smoking material portion 10 may have the form of a longitudinally extending rod whose length, circumference, and diameter are not particularly limited, but the length, circumference, and diameter may be adjusted to sizes generally used in the art in consideration of the amount of smoking material filled therein, user (consumer) preferences, or the like.

[0078] In some embodiments, the smoking article filter may be disposed downstream of the smoking material

portion 10. In some embodiments, the filter portion 20 of the smoking article filter is disposed downstream of the smoking material portion 10 and serves as a filter through which an aerosol material generated in the smoking material portion 10 passes right before being inhaled by the user (consumer or smoker). In some embodiments, the filter portion 20 may be manufactured using various materials or manufactured in various forms. Meanwhile, in the present specification, for convenience of description, the terms "smoking article filter" and "filter portion" may be interchangeably used.

[0079] In some embodiments, the smoking article filter may include the filter portion 20, a flavoring dispersed in the filter portion 20, a functional additive dispersed in the filter portion 20, and the filter portion wrapper 30b with which the filter portion 20 is wrapped.

[0080] In some embodiments, the filter portion 20 may include filter tow including a filter material. The filter material may include or may consist of cellulose-based fibers.

[0081] In some embodiments, the cellulose-based fibers included in the filter portion 20 may include or may consist of regenerated cellulose fibers, and the filter portion 20 may be regenerated cellulose tow. In some embodiments, the regenerated cellulose fibers may include or may consist of at least one or more of lyocell fibers, viscose fibers, and modal fibers. Preferably, the filter portion 20 may include lyocell tow including or consisting of lyocell fibers. That is, the regenerated cellulose tow including or consisting of a plurality of regenerated cellulose fibers may be lyocell tow including or consisting of a plurality of lyocell fibers.

[0082] In some embodiments, the lyocell tow may only include the plurality of lyocell fibers and may not include fibers other than the lyocell fibers. That is, in some embodiments, the lyocell tow may be made of the plurality of lyocell fibers. As the lyocell tow is made only of lyocell fibers, biodegradability of the smoking article filter including the filter portion including the lyocell tow may be excellent.

[0083] Description will be given below based on a case in which the regenerated cellulose fibers are lyocell fibers, and the regenerated cellulose tow is lyocell tow. However, the present disclosure is not limited thereto, and the regenerated cellulose fibers may be other fibers as long as the fibers are based on cellulose that is not chemically modified.

[0084] In some embodiments, the lyocell fibers may have a non-circular cross-section. The non-circular cross-section is defined as a cross-section having a shape including a plurality of protrusions instead of having a circular shape. For example, a cross-section having a shape in which a plurality of protrusions extend from the center may be referred to as "non-circular cross-section."

[0085] In some embodiments, the lyocell fibers may have a Y-shaped cross-section with three protrusions branching from the center, a cross-shaped cross-section with four protrusions, a star-shaped cross-section with five or more protrusions, or an O-shaped cross-section, but the present disclosure is not limited thereto.

[0086] In some embodiments, the filter portion 20 including the regenerated cellulose tow, preferably lyocell tow, may replace all or part of an existing smoking article filter, and when the filter portion 20 replaces part of an existing smoking article filter, a filter material that is used conventionally may be used together. In some embodiments, a cellulose acetate filter, a hollow tube filter, or the like may be used as the conventional filter material. In some embodiments, the filter portion 20 may consist of regenerated cellulose tow, preferably lyocell tow.

[0087] The filter portion 20 is illustrated as a mono filter made of a single filter in FIG. 1, but the present disclosure is not limited thereto. In some embodiments, the filter portion 20 may be provided as a dual filter, a triple filter, or the like, which includes two or more filters, in order to increase filter efficiency.

[0088] In some embodiments, the smoking article filter may include a flavoring dispersed therein. Specifically, the smoking article filter may include a flavoring dispersed in the filter portion 20. In some embodiments, the flavoring may be dispersed in the filter tow, preferably, lyocell tow. In some embodiments, the flavoring may be a flavor liquid material including a flavor component and may be a liquid.

[0089] Because the smoking article filter includes the flavoring, the flavoring in the smoking article filter may be transferred toward a downstream side as air flows from an upstream side (the smoking material portion side) toward the downstream side (the smoking article filter side) due to puff of the user. Also, the flavoring in the smoking article filter may be expressed toward the downstream side and introduced into the mouth of the user due to heat generated during combustion or heating of the smoking article, in addition to the flow of air caused by puff of the user.

[0090] In some embodiments, examples of the flavoring may include menthol, peppermint, spearmint oil, various fruit-flavored components, cinnamon, sage, herb, chamomile, kudzu, amacha, lavender, bergamot, lemon, orange, cinnamon, jasmine, ginger, vanilla, acacia, coffee, celery, sandalwood, cocoa, musk, ambergris, civet, castoreum, geraniol, linalool, anethole, eugenol, benzaldehyde, anisaldehyde, isoamyl acetate, linalyl acetate, isoamyl propionate, linalyl butyrate, etc., but the flavoring is not limited thereto. In some embodiments, the flavoring may include menthol, and liquid menthol may be dispersed in the lyocell tow. The flavoring may be a formulation of a component that can provide various flavors or tastes to the user (or smoker). In some embodiments, the flavoring may be a flavor liquid including or consisting of a flavor component, wherein the flavor component may include or may consist of menthol.

[0091] Because the flavoring is included in the filter portion (20) in an amount within the numerical range described below, it is possible to minimize a phenomenon in which the wrapper of the smoking article filter gets wet, a rough portion bursts, or an ink printed in the wrapper sets off due to the liquid flavoring. In some embodiments, the smoking article filter may include a functional additive dispersed therein. Specifically, the smoking article filter may include a functional additive dispersed in the filter tow of the filter portion 20. In some embodiments, the functional additive may be dispersed in the filter portion 20 together with the flavoring and may perform a function of improving the amount of flavoring persisting in the smoking article filter and the amount of flavoring being transferred.

[0092] In some embodiments, the functional additive may include at least one or more of polyethylene glycol (PEG), triethyl citrate (TEC), an oligomer that is a short-chain structure made by combining a few or a small number of polyhydric alcohols which are monomer units having the same structure, and an ether derivative of the oligomer. The oligomer may be a low molecular weight polymer in which two or more polyhydric alcohols of the same structure are repeated and combined, and the ether derivative of the oligomer may be a polymer in which at least one or more hydroxyl groups (-OH) of the polymer are substituted with ethers. As used in this specification, "oligomer" is a short-chain structure made by combining a few or a small number of monomers, in particular 2 to 10 monomers.

[0093] In some embodiments, the polyhydric alcohols constituting the oligomer, which is an example material of the functional additive, may include one of ethylene glycol (EG) and propylene glycol (PG).

[0094] In some embodiments, the functional additive may include one or more selected from the group consisting of polyethylene glycol (PEG), triethyl citrate (TEC), ethylene glycol oligomers, ethylene glycol oligomer ether derivatives which are ether derivatives of the ethylene glycol oligomers, propylene glycol oligomers, and propylene glycol oligomer ether derivatives which are ether derivatives of the propylene glycol oligomers.

[0095] In some embodiments, the ethylene glycol oligomer may include at least one or more of diethylene glycol (DEG), triethylene glycol (TEG), tetraethylene glycol (TetraEG), and pentaethylene glycol (PentaEG), and the propylene glycol oligomer may include at least one or more of dipropylene glycol (DPG), tripropylene glycol (TPG), tetrapropylene glycol (TetraPG), and pentapropylene glycol (PentaPG).

[0096] Preferably, in some embodiments, the functional additive may include or may consist of at least one or more of polyethylene glycol (PEG) and triethyl citrate (TEC). The functional additive may at least include or may consist of polyethylene glycol (PEG). More preferably, the functional additive may include or may consist of polyethylene glycol (PEG) and triethyl citrate (TEC).

[0097] In some embodiments, the smoking article filter may include the filter portion wrapper 30b with which the filter portion 20 is surrounded and wrapped. In some embodiments, the filter portion wrapper 30b may include wrapping paper. In some embodiments, the filter portion wrapper 30b may include general wrapping paper, general hard wrapping paper, grease-resistant general wrapping paper, or grease-resistant hard wrapping paper.

[0098] In some embodiments, the filter portion wrapper 30b may include hard wrapping paper. In the present specification, "hard wrapping paper" may refer to wrapping paper having a basis weight within or beyond a predetermined numerical range. In particular, hard wrapping paper may be wrapping paper having a basis weight of 40 gsm or more, preferably 50 gsm or more, more preferably 60 gsm or more, even more preferably 70 gsm or more, and still more preferably 75 gsm or more. "General wrapping paper" may refer to wrapping paper having a basis weight of less than 40 gsm, preferably less than 38 gsm, and more preferably less than 36 gsm. Because the filter portion wrapper 30b of the smoking article filter according to some embodiments includes hard wrapping paper, compared to when the smoking article filter includes general wrapping paper, the appearance of the smoking article filter can be better maintained, and an appropriate hardness can be imparted thereto.

[0099] In some embodiments, the hard wrapping paper included in the filter portion wrapper 30b may have a basis weight of 40 gsm or more, preferably 50 gsm or more, more preferably 60 gsm or more, even more preferably 70 gsm or more, and still more preferably 75 gsm or more.

[0100] In some embodiments, the filter portion wrapper 30b may include general hard wrapping paper or grease-resistant hard wrapping paper. Preferably, the filter portion wrapper 30b may include grease-resistant hard wrapping paper. Because the filter portion wrapper 30b of the smoking article filter includes the grease-resistant hard wrapping paper, it is possible to provide a smoking article filter with improved quality that prevents problems such as bursting of a rough portion or set-off of ink printed in the filter portion wrapper 30b or the tipping paper 40, and a smoking article including the same.

[0101] In some embodiments, the smoking material portion 10 wrapped with the smoking material portion wrapper 30a and the filter portion 20 wrapped with the filter portion wrapper 30b may be combined and wrapped with the tipping paper 40. As illustrated in FIG. 1, the tipping paper 40 may be wrapped around at least a portion (for example, a partial downstream region) of the smoking material portion wrapper 30a and an outer periphery of the filter portion wrapper 30b. In other words, in some embodiments, at least a portion of the smoking material portion 10 and the filter portion 20 may be further wrapped and physically combined with the tipping paper 40.

[0102] According to some embodiments of the present invention, the tipping paper 40 may be made of nonporous wrapping paper that has not been treated to be grease-resistant, but the present invention is not limited thereto. Also,

in some embodiments, the tipping paper 40 may include an incombustible material to prevent a phenomenon in which the filter portion 20 burns, but the present invention is not limited thereto.

[0103] The filter portion 20 of the smoking article filter according to one embodiment of the present invention will be described in detail below.

[0104] The present invention relates to a smoking article filter included in the smoking article 100, and the smoking article filter according to one embodiment of the present invention may include lyocell tow including a plurality of lyocell fibers, a flavoring dispersed in the lyocell tow, and a functional additive dispersed in the lyocell tow together with the flavoring.

[0105] In some embodiments, the lyocell fibers may be eco-friendly fibers made of cellulose extracted from wood pulp. The lyocell tow may be a bundle formed by cross-linking adjacent lyocell fibers.

[0106] In some embodiments, the lyocell fibers may have a non-circular cross-section. In some embodiments, the lyocell fibers may have a Y-shaped cross-section with three protrusions branching from the center, a cross-shaped cross-section with four protrusions, a star-shaped cross-section with five or more protrusions, or an O-shaped cross-section, but the present disclosure is not limited thereto. The terms mentioned herein have the same meanings as described above.

[0107] In some embodiments, the flavoring dispersed in the lyocell tow may include a flavor component. The flavoring may perform a function of expressing and delivering a flavor. In some embodiments, the flavoring may be a flavor liquid material, and the smoking article filter may be a transfer jet nozzle system (TJNS) filter in which the flavor liquid material is added onto the lyocell tow.

[0108] In some embodiments, the flavor liquid material may be a formulation that imparts a flavor to an aerosol generated from a tobacco material or a smoking material or mainstream smoke, and examples of the flavor liquid material may include menthol, peppermint, spearmint oil, various fruit-flavored components, cinnamon, sage, herb, chamomile, kudzu, amacha, lavender, bergamot, lemon, orange, cinnamon, jasmine, ginger, vanilla, acacia, coffee, celery, sandalwood, cocoa, musk, ambergris, civet, castoreum, geraniol, linalool, anethole, eugenol, benzaldehyde, anisaldehyde, isoamyl acetate, linalyl acetate, isoamyl propionate, linalyl butyrate, etc., but the flavor liquid material is not limited thereto. In some embodiments, the flavor liquid material may include or may consist of menthol.

[0109] In some embodiments, the total content of the flavor liquid material dispersed in the lyocell tow and included in the lyocell filter may be 1.0 mg or more and 30.0 mg or less, 1.0 mg or more and 29.0 mg or less, 1.0 mg or more and 28.0 mg or less, 1.0 mg or more and 27.0 mg or less, 1.0 mg or more and 26.0 mg or less, 1.0 mg or more and 25.0 mg or less, 1.0 mg or more and 24.0 mg or less, 1.0 mg or more and 23.0 mg or less, 1.0 mg or more and 22.0 mg or less, 1.0 mg or more and 21.0 mg or less, 1.0 mg or more and 20.0 mg or less, 1.5 mg or more and 19.0 mg or less, 2.0 mg or more and 18.0 mg or less, 2.5 mg or more and 15.0 mg or less, 3.0 mg or more and 14.5 mg or less, 4.0 mg or more and 14.0 mg or less, 5.0 mg or more and 13.5 mg or less, 5.5 mg or more and 13.0 mg or less, preferably 7.5 mg or more and 13.0 mg or less, and more preferably, 8.5 mg or more and 13.0 mg or less. Here, in some embodiments, the content of the flavor liquid material may have a range of 0.05 mg/mm or more and 0.75 mg/mm or less, preferably 0.32 mg/mm or more and 0.50 mg/mm or less, based on the length of the filter portion 20. When the content of the flavor liquid material is below the lower limit of the above range, a decrease may occur in the amount of expressed flavor, amount of transferred flavor, and amount of persisting flavor, and when the content of the flavor liquid material exceeds the upper limit of the above range, a problem may occur in formation of the smoking article filter, or problems such as set-off of ink, bursting of a rough portion, wetting of the wrapper, or leakage of the flavor liquid material during storage may occur.

[0110] In some embodiments, the functional additive may be dispersed in the lyocell tow together with the flavoring (or flavor liquid material). The functional additive is dispersed in the lyocell tow together with the flavoring (or flavor liquid material) as described above, and compared to a lyocell filter in which the functional additive is not dispersed, the amount of flavoring persisting in the lyocell filter and the amount of flavoring transferred during smoking can be improved even with long-term storage.

[0111] In some embodiments, the functional additive may be sprayed onto the lyocell tow after the flavoring is sprayed, the functional additive and the flavoring may be simultaneously sprayed onto the lyocell tow, or the flavoring may be sprayed after the functional additive is sprayed.

[0112] In some embodiments, the functional additive may include or may consist of at least one or more of polyethylene glycol (PEG) and triethyl citrate (TEC). The functional additive may at least include or may consist of polyethylene glycol (PEG). Preferably, the functional additive may include or may consist of polyethylene glycol (PEG) and triethyl citrate (TEC).

[0113] Meanwhile, polyethylene glycol (PEG) may not cause plasticization of the lyocell tow including the lyocell fibers. Accordingly, despite the functional additive being added, biodegradability of the lyocell filter including the lyocell tow may be excellent. Further, when polyethylene glycol (PEG) is added into the lyocell filter together with the flavor liquid (for example, menthol) despite not plasticizing the lyocell tow, the transfer amount, retention, and persistence of the flavor liquid can be improved.

[0114] In some embodiments, the functional additive may include or may consist of triethyl citrate (TEC) and polyethylene glycol (PEG), and a mixing ratio of the triethyl citrate (TEC) and polyethylene glycol (PEG) may range from 1:9 to 9:1, from 1:9 to 8:2, from 1:9 to 7:3, from 1:9 to 6:4, from 1:9 to 5:5, from 1:9 to 4:6, from 1:9 to 3:7, or from 1:9 to 2:8, and may preferably be 1:9, but the present disclosure is not limited thereto.

[0115] In some embodiments, the total content of the functional additive dispersed in the lyocell tow may be 1.0 mg or more and 25.0 mg or less, 2.0 mg or more and 23.0 mg or less, 2.5 mg or more and 20.0 mg or less, 2.8 mg or more and 18.0 mg or less, 3.0 mg or more and 15.0 mg or less, 3.3 mg or more and 14.0 mg or less, 3.5 mg or more and 13.5 mg or less, 4.0 mg or more and 13.0 mg or less, or preferably 4.5 mg or more and 12.5 mg or less. Here, in some embodiments, the content of the functional additive may have a range of 0.05 mg/mm or more and 0.85 mg/mm or less, preferably 0.15 mg/mm or more and 0.46 mg/mm or less, based on the length of the filter portion 20. When the content of the functional additive is below the lower limit of the above range, improvements in the expression amount, transfer amount, and persisting amount of flavor may not be significant, and when the content of the functional additive exceeds the upper limit of the above range, a problem may occur in formation of the smoking article filter, or problems such as set-off of ink, bursting of a rough portion, wetting of the wrapper, or leakage of the flavor liquid material during storage may occur.

[0116] FIG. 2 is a graph showing results of measuring the persisting amount of flavoring according to the storage period of smoking articles including filters according to Example 1 and Comparative Examples 1 and 2, FIG. 3 is a graph showing results of measuring the transfer amount of flavoring according to the storage period of smoking articles including filters according to Example 1 and Comparative Examples 1 and 2, and FIG. 4 is a graph showing results of measuring the transfer amount of flavoring per puff of smoking articles including filters according to Example 2 and Comparative Examples 3 and 4.

[0117] Hereinafter, the configurations of the present invention and the advantageous effects according thereto will be described in more detail using examples and comparative examples. However, the examples are merely for describing the present invention in more detail, and the scope of the present invention is not limited to these examples.

Example 1

[0118] A lyocell filter rod, that is, a smoking article filter rod, having a length of 108 mm and physical properties illustrated in Table 1 was manufactured by, using a TJNS method, adding menthol (flavoring, flavor liquid material) at 24.8 mg/rod and adding PEG (functional additive) at 60 mg/rod onto lyocell tow made of a plurality of lyocell fibers, and wrapping the lyocell tow with wrapping paper.

Comparative Example 1

[0119] A smoking article filter rod similar to Example 1 and having physical properties illustrated in Table 1 was manufactured except that PEG was not added as a functional additive in the lyocell filter.

Comparative Example 2

[0120] A smoking article filter rod similar to Comparative Example 1 and having physical properties illustrated in Table 1 was manufactured except that cellulose acetate tow was applied as fibers constituting the filter rod, and triacetin (TA) was applied in an amount of 7 wt% onto the cellulose acetate tow.

[0121] The smoking article filters according to Example 1 and Comparative Examples 1 and 2 having the physical properties shown in Table 1 below were manufactured.

[Table 1]

Classification	Weight (mg)	Resistance to Draw (mmWG)	Circumference (mm)	Hardness (Filtrona)
Example 1 (L Filter+Menthol+PEG)	896	455	24.2	93
Comparative Example 1 (L-Filter+Menthol)	855	472	24.2	91
Comparative Example 2 (CA Filter+Menthol)	836	456	24.2	94

Experimental Example 1: Analysis of transfer amount and persisting amount of menthol by storage period (1)

[0122] Smoking articles were manufactured by storing the smoking article filter rods, each having a length of 108

mm, of Example 1 and Comparative Examples 1 and 2 for different periods (0 months, 1 month, 6 months) under conditions including an internal temperature of 22 °C and a relative humidity of 60%, and then connecting smoking article filters 20, each having a length of 27 mm due to dividing the smoking article filter rods stored for different periods into four pieces, and a smoking material portion filled with cut tobacco by wrapping them with cigarette paper, the transfer amount of menthol generated from the manufactured smoking articles was measured, and the measurement results are shown in Table 2 below. Meanwhile, the transfer amount of menthol was analyzed using Agilent's GC(8890) by using a 44 mm Cambridge filter pad (CFP) to collect smoked smoke components after smoking with Borgwaldt's cigarette smoking machine RM20H, collecting menthol collected on the pad, and then extracting using a solvent (isopropyl alcohol).

[0123] In addition, after storing the smoking article filter rods, each having a length of 108 mm, of Example 1 and Comparative Examples 1 and 2 for 6 months under the conditions including an internal temperature of 22 °C and a relative humidity of 60%, the persisting amount of menthol included in the smoking article filters 20, each having a length of 27 mm due to dividing the smoking article filter rods stored for 6 months into four pieces, was measured, and the measurement results are shown in Table 3 below. Meanwhile, the persisting amount of menthol was analyzed using Agilent's GC(8890) FID by extracting (overnight), using an organic solvent (methanol), the amount of menthol persisting in the filters after smoking with Borgwaldt's cigarette smoking machine RM20H.

[Table 2]

Classification	Storage period	Transfer amount of menthol (mg/cia)
Example 1	0 months	1.0
	1 month	1.0
	6 months	1.0
Comparative Example 1	0 months	1.0
	1 month	1.1
	6 months	0.8
Comparative Example 2	0 months	1.6
	1 month	1.6
	6 months	1.3

[Table 3]

Classification	Storage period	Amount of menthol persisting in filter (mg/rod)
Example 1	6 months	3.6
Comparative Example 1	6 months	3.7
Comparative Example 2	6 months	3.0

[0124] Referring to Table 3, it can be confirmed that the persisting amount of menthol persisting in the filter was higher in Example 1 and Comparative Example 1 in which the filter was a lyocell filter including lyocell tow, compared to Comparative Example 2 in which the filter was a CA filter including CA tow. That is, it can be confirmed that flavor retention was higher in the lyocell filter made of the lyocell tow compared to the CA filter made of the CA tow. This is expected to be due to the hydrophilic property of the lyocell tow causing an increase in the persistence of menthol in the filter.

[0125] Next, referring to Table 2, it can be confirmed that the transfer amount of menthol at the time of long-term storage was more uniform and excellent in Example 1 in which PEG (functional additive) was added to the lyocell tow, compared to Comparative Example 1 in which PEG was not added. Meanwhile, referring to Comparative Example 1, it can be confirmed that a decrease in the transfer amount of flavor liquid occurred at the time of long-term storage in the case of the lyocell filter to which the flavor liquid (menthol) was added.

[0126] Accordingly, it can be confirmed that a decrease in the transfer amount of menthol can be prevented by adding PEG (functional additive) to the lyocell filter in which the transfer amount of menthol decreases due to the hydrophilic property, compared to the CA filter.

Experimental Example 2: Analysis of transfer amount and persisting amount of menthol by storage period (2)

[0127] The smoking article filter rods, each having a length of 108 mm, of Example 1 and Comparative Examples 1 and 2 were stored for different periods (1 day, 4 days, 11 days, 26 days, 41 days) under conditions including an internal temperature of 22 °C and a relative humidity of 60%, and then the persistence rate (%) of menthol by period was calculated and is shown in the graph of FIG. 2, and the transfer rate (%) of menthol by period was calculated and is shown in the graph of FIG. 3.

[0128] In FIG. 2, the X-axis represents the storage period, and the Y-axis represents the persistence rate (%) of menthol in the smoking article filter after smoking. For example, the total content of menthol added into the smoking article filter having a length of 27 mm due to dividing the smoking article filter rod having a length of 108 mm into four pieces may be 6.2 mg, and the persistence rate (%) of menthol by period may be the percentage (%) of the content of menthol persisting in the filter by period relative to the total content of menthol added into the smoking article filter. That is, a value obtained by dividing the content of menthol persisting in the filter by period by the total content of menthol added into the filter is shown as a percentage.

[0129] In addition, in FIG. 3, the X-axis represents the storage period, and the Y-axis represents the transfer rate (%) of menthol in the mainstream smoke after smoking. The transfer rate of menthol may be the percentage (%) of the total content of menthol included in the smoking article filter relative to a predetermined transfer amount of menthol per puff. That is, for the filters by period, a value obtained by dividing the content of menthol included in the mainstream smoke after passing through the filter by the total content of menthol added into the filter is shown as a percentage.

[0130] Referring to FIGS. 2 and 3, it can be confirmed that the transfer rate of menthol was more similar between Example 1 and Comparative Example 2 with an increase in the storage period to 41 days or more, and the transfer rate of menthol significantly increased in Example 1 compared to Comparative Example 1. Accordingly, it can be confirmed that, by adding a functional additive, the transfer rate of menthol can be provided to be similar to when cellulose acetate is applied, despite applying the lyocell filter.

Example 2

[0131] A smoking article was manufactured by connecting a smoking material portion filled with cut tobacco and a smoking article filter having a length of 27 mm, manufactured by, using a TJNS method, adding menthol (flavoring, flavor liquid material) at 5.5 mg/rod and adding PEG (functional additive) at 14 mg/rod onto lyocell tow made of a plurality of lyocell fibers and wrapping the lyocell tow with grease-resistant hard wrapping paper having a basis weight of 75 gsm, and wrapping the smoking material portion and the smoking article filter with cigarette paper.

Comparative Example 3

[0132] A smoking article was manufactured in the same manner as in Example 2 except that PEG was not added as a functional additive in the lyocell filter.

Comparative Example 4

[0133] A smoking article was manufactured in the same manner as in Comparative Example 3 except that cellulose acetate tow was applied as fibers constituting the filter rod, and triacetin (TA) was applied in an amount of 7 wt% onto the cellulose acetate tow.

Experimental Example 3: Analysis of menthol transfer pattern per puff

[0134] The content of menthol included in smoke components smoked by smoking the smoking articles according to Example 2 and Comparative Examples 3 and 4 with a cigarette smoking machine was measured, the transfer amount of menthol in the mainstream smoke was analyzed per puff, and the transfer amount of menthol per puff and the total transfer amount of menthol are shown in Table 4 and the graph of FIG. 4.

[Table 4]

Puff count	Transfer amount of menthol (mg/puff)		
	Comparative Example 4	Comparative Example 3	Example 2
1	0.22	0.23	0.23
2	0.24	0.23	0.23

(continued)

Puff count	Transfer amount of menthol (mg/puff)		
	Comparative Example 4	Comparative Example 3	Example 2
3	0.22	0.19	0.20
4	0.18	0.16	0.15
5	0.15	0.13	0.12
6	0.11	0.10	0.10
7	0.08	0.08	0.07
8	0.06	0.07	0.07
9	0.05	0.06	0.06
10	0.04	0.05	0.06
11	0.04	0.05	0.05
12	0.03	0.05	0.05
13	0.03	0.05	0.04
14	0.03	0.04	0.04
Deviation	0.08	0.07	0.07
Total transfer amount (mg)	1.48	1.49	1.47

[0135] Referring to Table 4 and FIG. 4, it can be confirmed that, although the transfer amount of menthol per puff was higher in Comparative Example 4 than in Comparative Example 3 and Example 2 in initial puffs (the first to fifth puffs), the transfer rate per puff in Comparative Example 4 gradually became lower than in Example 2 and Comparative Example 3 starting from the eighth puff, that is, toward a later stage. That is, it can be confirmed that transfer uniformity of menthol per puff was better in Example 2 and Comparative Example 3 than in Example 4 from the start of smoking to the end of smoking. Accordingly, it can be confirmed that transfer uniformity of menthol is improved in the lyocell filter compared to the CA filter.

Comparative Example 5 (Classification 10)

[0136] A smoking article filter rod (a lyocell filter rod) having a resistance to draw of 450 mmWG, a length of 108 mm, and a circumference of 24.2 mm was manufactured by wrapping lyocell tow including a plurality of lyocell fibers and having a weight of 700 mg with general hard wrapping paper having a basis weight of 75 gsm.

Comparative Example 6 (Classification 11)

[0137] A smoking article filter rod was manufactured in the same manner as in Comparative Example 5 except that a flavor liquid (flavoring) including menthol at 50% was sprayed onto the lyocell tow and added in an amount of 50 mg/rod.

Example 3 (Classification 12)

[0138] A smoking article filter rod was manufactured in the same manner as in Comparative Example 6 except that a functional additive including TEC and PEG mixed at a ratio of 1:9 was further added in an amount of 20 mg/rod to the smoking article filter rod.

Example 4 (Classification 13)

[0139] A smoking article filter rod was manufactured in the same manner as in Comparative Example 6 except that a functional additive including TEC and PEG mixed at a ratio of 1:9 was further added in an amount of 40 mg/rod to the smoking article filter rod.

Example 5 (Classification 14)

[0140] A smoking article filter rod was manufactured in the same manner as in Comparative Example 6 except that a functional additive including TEC and PEG mixed at a ratio of 1:9 was further added in an amount of 60 mg/rod to the smoking article filter rod.

Comparative Example 7 (Classification 4)

[0141] A smoking article filter rod was manufactured in the same manner as in Comparative Example 5 except that the lyocell tow was wrapped with grease-resistant hard wrapping paper having a basis weight of 75 gsm.

Comparative Example 8 (Classification 5)

[0142] A smoking article filter rod was manufactured in the same manner as in Comparative Example 7 except that a flavor liquid (flavoring) including menthol at 50% was sprayed onto the lyocell tow and added in an amount of 30 mg/rod.

Comparative Example 9 (Classification 6)

[0143] A smoking article filter rod was manufactured in the same manner as in Comparative Example 7 except that a flavor liquid (flavoring) including menthol at 50% was sprayed onto the lyocell tow and added in an amount of 50 mg/rod.

Example 6 (Classification 7)

[0144] A smoking article filter rod was manufactured in the same manner as in Comparative Example 9 except that a functional additive including TEC and PEG mixed at a ratio of 1:9 was further added in an amount of 20 mg/rod to the smoking article filter rod.

Example 7 (Classification 8)

[0145] A smoking article filter rod was manufactured in the same manner as in Comparative Example 9 except that a functional additive including TEC and PEG mixed at a ratio of 1:9 was further added in an amount of 40 mg/rod to the smoking article filter rod.

Example 8 (Classification 9)

[0146] A smoking article filter rod was manufactured in the same manner as in Comparative Example 9 except that a functional additive including TEC and PEG mixed at a ratio of 1:9 was further added in an amount of 60 mg/rod to the smoking article filter rod.

Experimental Example 5: Evaluation of appearance quality for different added amounts of flavor liquid and functional additive in filters and for different types of wrappers

[0147] The smoking article filters according to Examples 3 to 8 and Comparative Examples 5 to 9 were stored for 8 weeks under room temperature conditions (an internal temperature of 22 °C and a relative humidity of 60%), the physical properties and appearance qualities of the smoking article filters were evaluated, and the evaluation results are shown in Table 5 below.

[Table 5]

Classification	Aging (physical properties)	Bursting of rough portion	Wetting of paper case	Set-off of ink
Comparative Example 5	Fine	None	Fine	Fine
Comparative Example 6	Fine	None	Fine	Occurred
Example 3	Fine	None	Fine	Occurred
Example 4	Fine	None	Slightly increased	Occurred

(continued)

Classification	Aging (physical properties)	Bursting of rough portion	Wetting of paper case	Set-off of ink
Example 5	Fine	None	Slightly increased	Occurred
Comparative Example 7	Fine	None	Fine	Fine
Comparative Example 8	Fine	None	Fine	Fine
Comparative Example 9	Fine	None	Fine	Occurred
Example 6	Fine	None	Fine	Fine
Example 7	Fine	None	Fine	Fine
Example 8	Fine	None	Slightly increased	Fine

[0148] In Table 5, referring to Comparative Examples 5 and 6 and Examples 3 to 5 in which the smoking article filter rods were manufactured using general hard wrapping paper, it can be confirmed that, while set-off of ink did not occur in Comparative Example 5 in which the flavor liquid was not added, set-off of ink occurred in Comparative Example 6 and Examples 3 to 5 in which the flavor liquid was added. That is, it can be confirmed that, when the smoking article filter rod was manufactured using general hard wrapping paper, a problem occurred in which the flavor liquid added into the filter leaked to the outside and the printed ink set off to the tipping paper.

[0149] Meanwhile, referring to Comparative Example 9 and Examples 6 and 7 in which the amount of added flavor liquid was the same and the smoking article filter rods were manufactured using grease-resistant hard wrapping paper, it can be confirmed that, while set-off of ink occurred in Comparative Example 9 in which the functional additive (PEG+TEC) was not added, set-off of ink did not occur in Examples 6 and 7. That is, this is expected to be due to the functional additive allowing the flavor liquid to stably persist in the lyocell tow, causing the amount of flavor liquid leaking to the outside to decrease and not leading to set-off of ink, despite the same amount of added flavor liquid.

[0150] In addition, referring to Examples 6 to 8 in which the amount of added flavor liquid was the same and the smoking article filter rods were manufactured using grease-resistant hard wrapping paper, it can be confirmed that, while physical properties were fine and bursting of a rough portion, wetting of a paper case, and set-off of ink did not occur in Examples 6 and 7, wetting of a paper case occurred in Example 8. From this, it can be confirmed that, when the functional additive (PEG+TEC) was applied, although set-off of ink did not occur, the amount of leaking liquid material increased with an increase in the added amount of the functional additive, and wetting of a paper case occurred.

[0151] In addition, referring to Examples 3 and 6 in which the amount of added flavor liquid and the amount of added functional additive were the same, but the wrapper with which the filter was wrapped was different (general hard wrapping paper in Example 3 and grease-resistant hard wrapping paper in Example 6), and referring to Examples 4 and 7 in which the amount of added flavor liquid and the amount of added functional additive were the same, but the wrapper with which the filter was wrapped was different (general hard wrapping paper in Example 4 and grease-resistant hard wrapping paper in Example 7), it can be confirmed that, while wetting of a paper case and/or set-off of ink occurred in Examples 3 and 4, wetting of a paper case and/or set-off of ink did not occur in Examples 6 and 7. That is, it can be confirmed that occurrence of wetting of a paper case and set-off of ink is minimized when grease-resistant hard wrapping paper treated to be grease-resistant is applied while the content of the functional additive and the content of the flavor liquid are the same.

[0152] Accordingly, when a smoking article filter rod having a length of 108 mm and a circumference of 24.2 mm is manufactured by wrapping lyocell tow including a plurality of lyocell fibers and having a weight of about 700 mg with grease-resistant hard wrapping paper after adding a flavor liquid including menthol in an amount of 50 mg/rod and adding a functional additive including TEC and PEG mixed at a ratio of 1:9 in an amount ranging from 20 mg/rod to 40 mg/rod to the lyocell tow, while the transfer amount and persisting amount of menthol are excellent, occurrence of bursting of a filter wrapper or tipping paper or set-off of ink due to the flavor liquid and the functional additive can be minimized.

[0153] Although embodiments of the present disclosure have been described above with reference to the accompanying drawings, those of ordinary skill in the art to which the present disclosure pertains should understand that the present disclosure may be embodied in other specific forms without changing the technical spirit or essential features thereof. Therefore, the embodiments described above should be understood as being illustrative, instead of limiting, in all aspects. The scope of protection of the present disclosure should be interpreted based on the claims below, and all technical ideas within the scope equivalent to the claims should be interpreted as falling within the scope of rights of the technical spirit defined by the present disclosure.

Claims

1. A smoking article filter comprising:

filter tow including regenerated cellulose fibers;
a flavoring dispersed in the filter tow; and
a functional additive dispersed in the filter tow.

2. The smoking article filter of claim 1, wherein the regenerated cellulose fibers include at least one or more of lyocell fibers, viscose fibers, and modal fibers.

3. The smoking article filter of claim 2, wherein:

the regenerated cellulose fibers consist of lyocell fibers; and
the filter tow consists of lyocell tow.

4. The smoking article filter of claim 1, wherein the flavoring is a flavor liquid including a flavor component.

5. The smoking article filter of claim 4, wherein:

the flavor liquid includes menthol; and
the total content of the flavor liquid included in the smoking article filter is 1.0 mg or more and 30.0 mg or less.

6. The smoking article filter of claim 1, wherein the functional additive includes one or more selected from the group consisting of polyethylene glycol (PEG), triethyl citrate (TEC), ethylene glycol oligomers, ethylene glycol oligomer ether derivatives which are ether derivatives of the ethylene glycol oligomers, propylene glycol oligomers, and propylene glycol oligomer ether derivatives which are ether derivatives of the propylene glycol oligomers.

7. The smoking article filter of claim 6, wherein:

the functional additive includes polyethylene glycol (PEG) and triethyl citrate (TEC); and
a mixing ratio of the triethyl citrate (TEC) and polyethylene glycol (PEG) ranges from 1:9 to 9:1

8. The smoking article filter of claim 1, wherein the total content of the functional additive dispersed in the filter tow is 1.0 mg or more and 25.0 mg or less.

9. The smoking article filter of claim 1, wherein the total content of the functional additive dispersed in the filter tow is 0.05 mg/mm or more and 0.85 mg/mm or less.

10. A smoking article comprising:

a smoking material portion; and
a filter portion disposed downstream of the smoking material portion,
wherein the filter portion includes:

lyocell tow made of lyocell fibers;
a flavor liquid dispersed in the lyocell tow;
a functional additive dispersed in the lyocell tow; and
a wrapper surrounding the lyocell tow,
wherein the wrapper is hard wrapping paper having a basis weight of 40 gsm or more.

FIG. 1

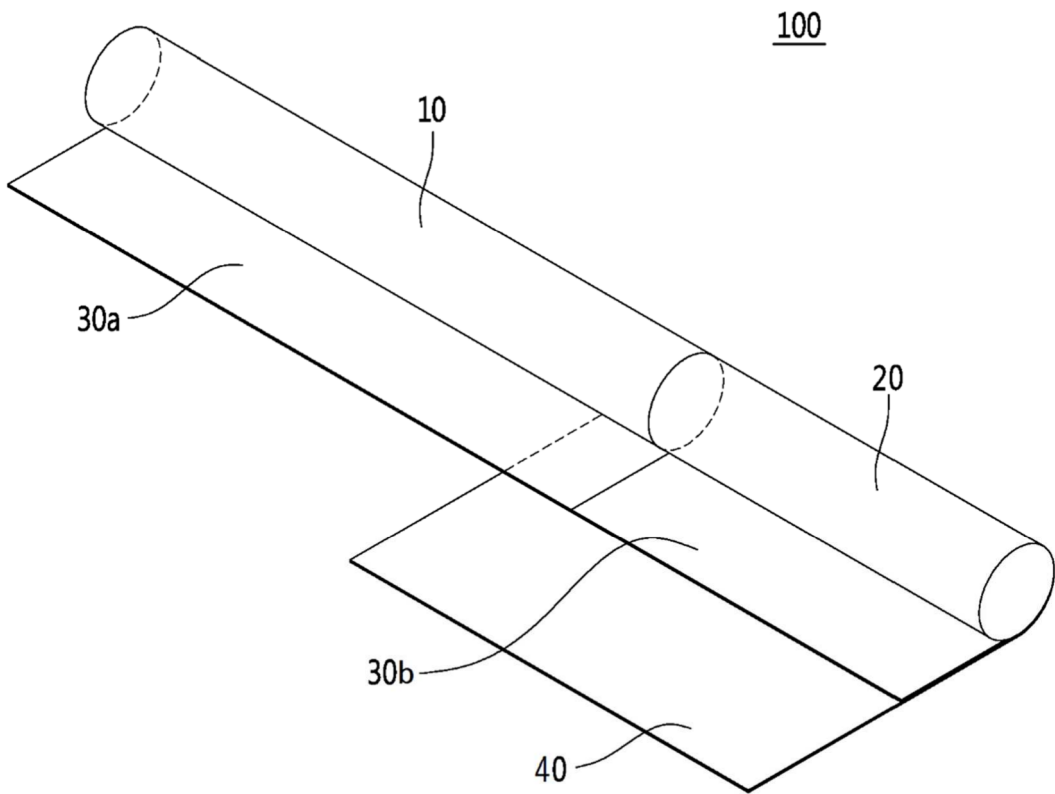


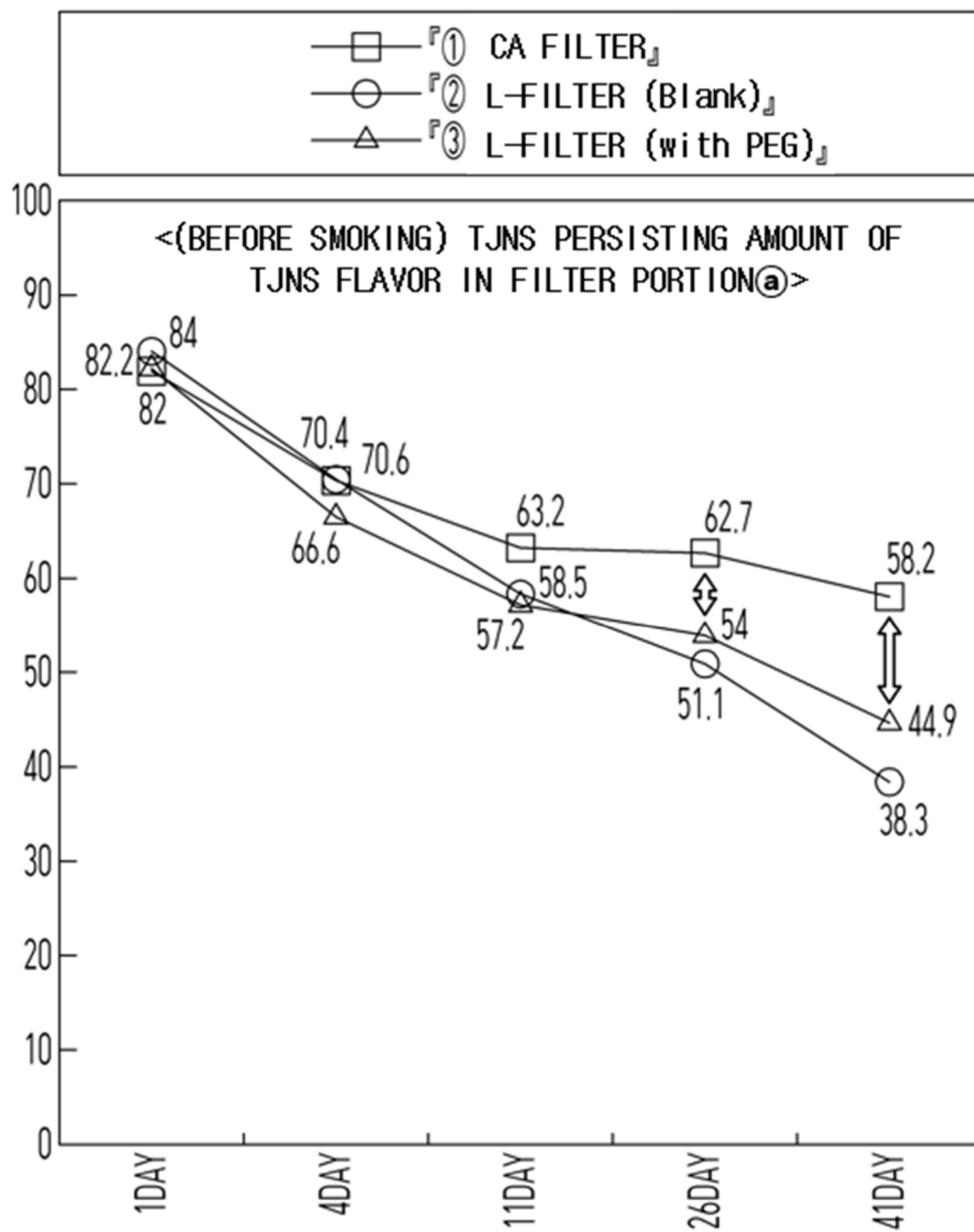
FIG. 2

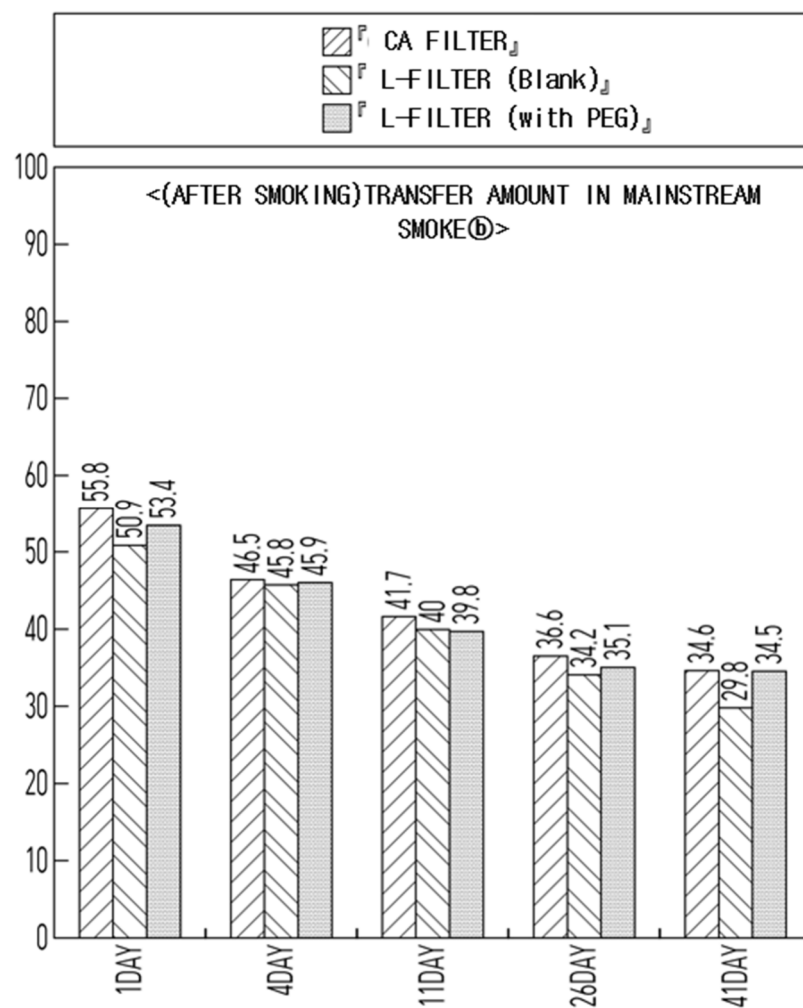
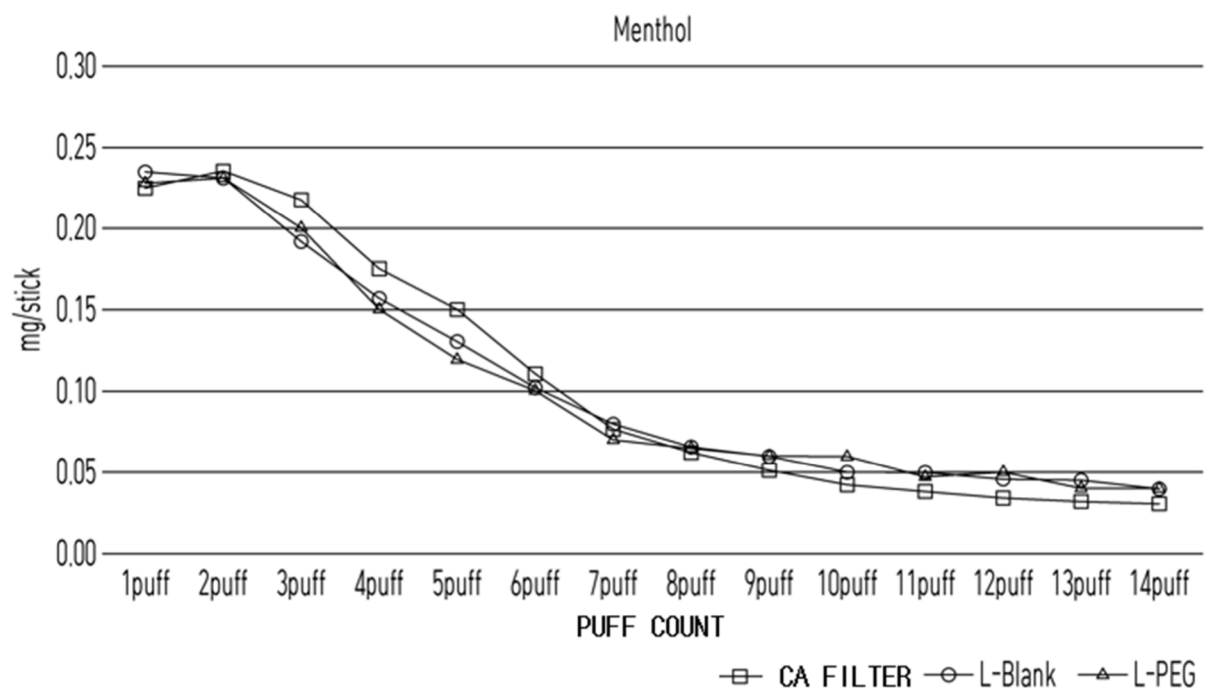
FIG. 3

FIG. 4



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