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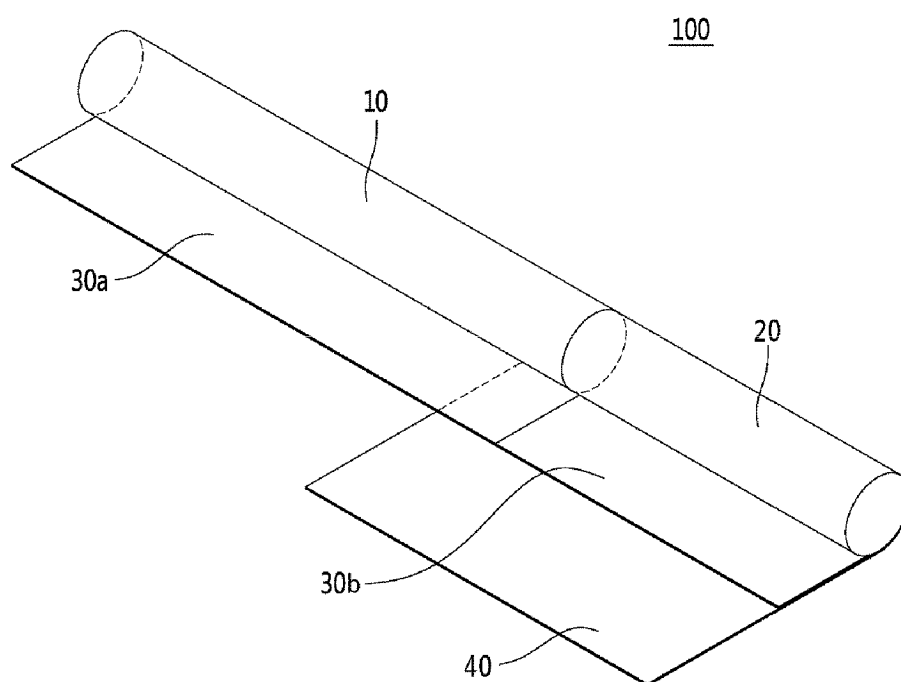
(54) **FILTER FOR SMOKING ARTICLE, COMPRISING LYOCCELL TOW, AND SMOKING ARTICLE COMPRISING SAME**

(57) Provided are a smoking article filter and a smoking article. The smoking article filter includes lyocell tow including lyocell fibers and a phenol reducing material dispersed in the lyocell tow, wherein the phenol reducing

material includes triacetin (TA), and the content of the triacetin (TA) ranges from 0.10 mg to 1.50 mg per length (mm) of the lyocell tow.

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FIG. 1



Description

[Technical Field]

- 5 **[0001]** The present invention relates to a smoking article filter in which triacetin (TA) is added as a phenol reducing material to lyocell tow and a smoking article including the smoking article filter.

[Background Art]

- 10 **[0002]** Typical cigarette filters include cellulose acetate tow formed by extracting cellulose from wood pulp and acetylating the extracted cellulose. Also, cigarette filters are assembled into cigarette products, distributed to consumers, provided for smoking, and then finally discarded after smoking is completed. Also, some cigarette filters are directly discarded as manufacturing residue from a cigarette filter manufacturing plant. This cigarette filter waste is collected as refuse and landfilled for disposal. In addition, in some cases, smoked cigarettes are left in the natural environment without
15 being collected as refuse.

[0003] Accordingly, in recent years, research for replacing cellulose acetate tow with an eco-friendly material to protect the natural environment and reduce costs has been carried out. For example, the development of tow (that is, lyocell tow) using lyocell fibers in which the cellulose itself is fiberized unlike cellulose acetate is in progress.

- 20 **[0004]** In manufacturing a smoking article filter, a phenol reducing material that can specifically reduce phenols generated during smoking is added to reduce phenols in mainstream smoke. Conventionally, it is known that polyethylene glycol (PEG), triethyl citrate (TEC), triacetin (TA), and the like are added as a phenol reducing material to cellulose acetate tow. In a case where a phenol reducing material composed of PEG and TEC is added to cellulose acetate which is hydrophobic, there is a problem in that the phenol reducing material also serves as a plasticizer for cellulose acetate fibers and causes the cellulose acetate fibers, which are hydrophobic, to bond to each other, thus reducing biodegradability.

- 25 **[0005]** Meanwhile, in a case where a phenol reducing material such as PEG, TEC, or triacetin (TA) is added to lyocell fibers, the lyocell fibers, which are hydrophilic, are not plasticized. Accordingly, the addition of a phenol reducing material such as PEG, TEC, and TA to lyocell fibers has been found to reduce phenols in mainstream smoke while not degrading biodegradability.

- 30 **[0006]** Meanwhile, in the case where a phenol reducing material is added to lyocell fibers to reduce phenols in mainstream smoke, there is a need for optimal design of a phenol reducing material that maintains the physical properties of a smoking article filter and has the best phenol reducing performance.

[Disclosure]

- 35 [Technical Problem]

[0007] One object of the present invention is to provide a smoking article filter in which triacetin (TA), whose content is designed to be optimal, is added to lyocell tow to constitute the smoking article filter, thereby more effectively removing components such as phenols present in cigarette smoke during smoking and having excellent biodegradability.

- 40 **[0008]** Another object of the present invention is to provide a smoking article including a smoking article filter in which triacetin (TA), whose content is designed to be optimal, is added to lyocell tow to constitute the smoking article filter, thereby more effectively removing components such as phenols present in cigarette smoke passing through the smoking article filter during smoking and having excellent biodegradability.

- 45 [Technical Solution]

[0009] One embodiment for achieving the one object provides a smoking article filter including: lyocell tow including lyocell fibers; and a phenol reducing material dispersed in the lyocell tow, wherein the phenol reducing material includes triacetin (TA).

- 50 **[0010]** In some embodiments, the content of the triacetin (TA) may range from 0.10 mg to 1.50 mg per length (mm) of the lyocell tow.

[0011] In some embodiments, the content of the triacetin (TA) may range from 0.5 mg to 0.85 mg per length (mm) of the lyocell tow.

[0012] In some embodiments, the smoking article filter may have a hardness ranging from 70% to 95%.

- 55 **[0013]** In some embodiments, the lyocell fibers may have a shaped cross-section.

[0014] In some embodiments, the lyocell tow may include a plurality of lyocell fibers, and the phenol reducing material may not include a material for binding the plurality of lyocell fibers to each other.

[0015] In some embodiments, the triacetin (TA) may be included in an amount ranging from 0.05 wt% to 20 wt% relative

to the weight of the lyocell tow.

[0016] In some embodiments, the triacetin (TA) may be included in an amount ranging from 0.1 wt% to 15 wt% relative to the weight of the lyocell tow.

[0017] One embodiment for achieving the another object provides a smoking article including: a smoking material portion; a filter portion disposed downstream of the smoking material portion; and a wrapper configured to wrap around the smoking material portion or the filter portion, wherein the filter portion includes lyocell tow including lyocell fibers and a phenol reducing material dispersed in the lyocell tow, and the phenol reducing material includes triacetin (TA).

[0018] In some embodiments, the content of the triacetin (TA) may range from 0.10 mg to 1.50 mg per length (mm) of the lyocell tow.

[0019] In some embodiments, the triacetin (TA) may be included in an amount ranging from 0.1 wt% to 15 wt% relative to the weight of the lyocell tow.

[Advantageous Effects]

[0020] According to a smoking article filter and a smoking article including the same according to one embodiment, it is possible to provide a lyocell filter to which lyocell tow, to which triacetin (TA) is added as a phenol reducing material, is applied, and in this way, components such as phenols present in cigarette smoke can be more effectively removed during smoking.

[0021] Also, since triacetin (TA) does not act as a plasticizer for lyocell tow, which is hydrophilic, despite being added to the lyocell tow, it is possible to provide a smoking article filter having excellent biodegradability while having phenol reducing performance and a smoking article including the smoking article filter.

[0022] In addition, by designing the optimal content of triacetin (TA) added to lyocell tow, components such as phenols present in cigarette smoke can be more effectively removed during smoking.

[0023] The advantageous effects according to the technical spirit of the present disclosure are not limited to those mentioned above, and other unmentioned advantageous effects can be clearly understood by those of ordinary skill in the art from the description below.

[Description of Drawings]

[0024] FIG. 1 is a view illustrating a schematic configuration of a smoking article according to one embodiment of the present invention.

[Modes of the Invention]

[0025] 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.

[0026] 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.

[0027] 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.

[0028] 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 component 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.

[0029] The terms "comprises" and/or "comprising" used herein do not preclude the presence or addition of one or more components, steps, operations, and/or devices other than those mentioned.

[0030] First, some terms used herein will be clarified.

[0031] 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.

[0032] In the present specification, "smoking material" may refer to any type of material that may be used in a smoking article.

[0033] In the present specification, "upstream" or "upstream direction" may refer to a direction moving away from an oral region of a smoker, and "downstream" or "downstream direction" may refer to a direction approaching the oral region of the smoker.

[0034] In the present specification, "longitudinal direction" may refer to a direction corresponding to a longitudinal axis of a smoking article.

[0035] Hereinafter, various embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

[0036] FIG. 1 is a view illustrating a schematic configuration of a smoking article according to one embodiment of the present invention.

[0037] 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 or an aerosol-forming substrate. Also, the smoking article may include a solid material based on tobacco raw materials, such as reconstituted tobacco leaves, shredded tobacco, and reconstituted tobacco. A smoking material may include volatile compounds.

[0038] Also, throughout the specification, "upstream" or "upstream direction" refers to a direction moving away from an oral region of a user smoking a smoking article 100, and "downstream" or "downstream direction" refers to a direction approaching the oral region of the user smoking the smoking article 100. For example, in the smoking article 100 illustrated in FIG. 1, a smoking material portion 10 is disposed upstream or in an upstream direction of a smoking article filter portion 20 (a smoking article filter 20 or a filter portion 20).

[0039] Further, in the specification, a case where the smoking article 100 is a combustion-type cigarette is described as an example. However, the present invention is not limited thereto, and the smoking article 100 may also be a heating-type cigarette or the like that is used together with an aerosol generation device (not illustrated) such as an electronic cigarette device.

[0040] The present invention relates to the smoking article filter 20 (or the smoking article filter portion 20 or the filter portion 20) included in the smoking article 100, and the smoking article filter 20 according to one embodiment of the present invention includes lyocell tow including lyocell fibers and a phenol reducing material added to the lyocell tow, wherein the phenol reducing material includes triacetin (TA).

[0041] The "phenol" may refer to a group of chemical compounds composed of hydroxyl groups (-OH) directly bound to aromatic hydrocarbon functional groups, and a phenolic group includes phenol, catechol, m+P cresol, and o-cresol. The "phenol reducing material" may correspond to a material that can specifically reduce a phenolic material in smoke generated during smoking, for example, at least one of phenol, catechol, m+P cresol, and o-cresol.

[0042] The lyocell fibers are eco-friendly fibers made of cellulose extracted from wood pulp. The lyocell tow refers to a bundle formed by cross-connecting adjacent lyocell fibers.

[0043] In some embodiments, the lyocell fibers may have a shaped cross-section. The shaped 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 "shaped cross-section."

[0044] 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 protrusions, or an O-shaped cross-section, but the present invention is not limited thereto.

[0045] In some embodiments, the phenol reducing material may be uniformly dispersed in the lyocell tow and may be distributed throughout the entire region of the lyocell tow constituting the smoking article filter. The phenol reducing material including triacetin (TA) may be applied on the surfaces of the lyocell fibers constituting the lyocell tow.

[0046] The phenol reducing material including triacetin (TA) may be dispersed in lyocell tow in any manner. In some embodiments, the phenol reducing material including triacetin (TA) may be applied on lyocell tow and dispersed in the lyocell tow in a spray type manner, for example, a transfer jet nozzle system (TINS) manner. However, the present invention is not limited thereto, and the phenol reducing material including triacetin (TA) may also be dispersed in lyocell tow using a brush type manner. Accordingly, a smoking article filter including lyocell tow in which the phenol reducing material including triacetin (TA) is dispersed may be manufactured without adding or modifying manufacturing equipment.

[0047] In the smoking article filter according to the present invention, despite the phenol reducing material including triacetin (TA) being applied on the surfaces of the lyocell fibers, triacetin (TA) may not act as a plasticizer between the lyocell fibers. Accordingly, even when triacetin (TA) is added as a phenol reducing material to lyocell tow, a plurality of

lyocell fibers included in the smoking article filter may not be substantially connected to each other, and the biodegradability of the smoking article filter may not be reduced. That is, an additive for binding the lyocell fibers together may not be included in the smoking article filter according to the present invention.

[0048] The smoking article filter to which lyocell tow is applied according to the present invention includes a phenol reducing material including triacetin (TA) that is dispersed in the lyocell tow and thus may have a greater effect of reducing phenols generated during smoking, compared to a smoking article filter to which triacetin (TA) is not added.

[0049] In some embodiments, the content of triacetin (TA) dispersed in the lyocell tow may range from 3 mg/rod to 40 mg/rod, 4 mg/rod to 30 mg/rod, 5 mg/rod to 25 mg/rod, 8 mg/rod to 24 mg/rod, 10 mg/rod to 23 mg/rod, 15 mg/rod to 22 mg/rod, or 18 mg/rod to 21.5 mg/rod, preferably, 19 mg/rod to 21 mg/rod. The above range of the content of triacetin (TA) may be suitable for a lyocell filter having a diameter of 7.71 mm and a length of 27 mm. In a case where triacetin (TA) is dispersed and included in the above range in the lyocell tow, phenol reducing performance may be excellent while physical properties of the smoking article filter are maintained.

[0050] In some embodiments, the content of triacetin (TA) dispersed in the lyocell tow may range from 0.10 mg to 1.50 mg, 0.14 mg to 1.20 mg, 0.18 mg to 0.95 mg, 0.25 mg to 0.90 mg, 0.30 mg to 0.88 mg, 0.5 mg to 0.85 mg, or 0.65 mg to 0.80 mg, preferably, 0.7 mg to 0.78 mg, per length (mm) of the lyocell tow. In a case where triacetin (TA) is dispersed and included in the above range in the lyocell tow, phenol reducing performance may be excellent while physical properties of the smoking article filter are maintained.

[0051] In some embodiments, triacetin (TA) dispersed in the lyocell tow may be added at 0.05 wt% to 20 wt% or 0.1 wt% to 15 wt% of the weight of the lyocell tow.

[0052] In some embodiments, the smoking article filter including the lyocell tow in which the phenol reducing material including triacetin (TA) is dispersed may have a hardness ranging from 60% to 98%, 65% to 97%, or 70% to 95%. The hardness of the smoking article filter is a numerical value of the degree to which a diameter of the smoking article filter is maintained when the smoking article filter is pressed with a force of a certain level in a direction perpendicular to the longitudinal direction of the smoking article filter and may be a percentage value of a ratio of a diameter of the smoking article filter after the force is applied to a diameter of the smoking article filter before the force is applied. Specifically, the hardness of the smoking article filter is measured using Mathematical Formula 1 below.

[Mathematical Formula 1]

$$\text{Hardness of smoking article filter (\%)} = a/D \times 100$$

(D represents a diameter of the smoking article filter, and a represents a diameter of the smoking article filter after the smoking article filter is pressed for a predetermined amount of time using a weight.)

[0053] The smoking article filter including lyocell tow and triacetin (TA) dispersed in a predetermined content range in the lyocell tow according to one embodiment of the present invention can reduce a delivered amount of a phenolic material in smoke passing through the filter, compared to a smoking article filter including lyocell tow in which triacetin (TA) is not dispersed. The delivered amount of the phenolic material in smoke passing through the smoking article filter according to one embodiment of the present invention may be reduced 15% to 50%, 20% to 45%, 25% to 44%, or 30% to 43% compared to the delivered amount of the phenolic material in smoke passing through the smoking article filter to which the lyocell tow in which triacetin (TA) is not dispersed is applied.

[0054] In some embodiments, the smoking article filter may further include a capsule configured to generate a flavor. Specifically, the smoking article filter may further include a crushable capsule disposed in the lyocell tow and having a structure in which a liquid including a flavoring is wrapped with a film. One or more crushable capsules may be included in the lyocell tow in which triacetin (TA) is dispersed.

[0055] In some embodiments, the smoking article filter may further include a wrapper (or a filter portion wrapper) configured to wrap around the lyocell tow in which triacetin (TA) is dispersed. The filter portion wrapper may have a basis weight of 90 mg-² or less, but the present invention is not limited thereto.

[0056] 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

[0057] Using HAUNI's KDF-2 equipment, triacetin (TA) was added at 5 mg/rod onto lyocell tow, and then the lyocell tow having triacetin (TA) dispersed therein was wrapped with wrapping paper to manufacture a smoking article filter having a length of 27 mm, a diameter of 7.71 mm, and a resistance to draw of 400 mmWG/108 mm.

Example 2

[0058] A smoking article filter was manufactured in the same manner as in Example 1 except that triacetin (TA) added onto the lyocell tow was added at 10 mg/rod instead of 5 mg/rod.

Example 3

[0059] A smoking article filter was manufactured in the same manner as in Example 1 except that triacetin (TA) added onto the lyocell tow was added at 20 mg/rod instead of 5 mg/rod.

Comparative Example 1

[0060] A smoking article filter was manufactured in the same manner as in Example 1 except that triacetin (TA) was not added as a phenol reducing material onto the lyocell tow.

Experimental Example 1: Evaluation of phenol reducing performance according to content of triacetin (TA)

[0061] Smoking articles were manufactured using the smoking article filters of Comparative Example 1 and Examples 1 to 3, smoke components emitted during smoking using the cigarette smoking machine HAUNI LX20 manual (linear type) as a smoking device under HC conditions (puff volume: 55 ml / puff frequency: 30 s / puff duration: 2 s / vent blocking) as smoking conditions were collected using a Cambridge filter pad (CFP), and in order to extract substances from the smoke components collected on the CFP, 30 mL of 1% acetic acid was added and then stirred, the substances were filtered using a 0.45 μ m PVDF syringe filter, phenols in the smoke passing through each smoking article filter were measured and analyzed using an Alliance HPLC-FLD analysis device of Waters Corporation, and results thereof are shown in Table 1 below.

[Table 1]

	Phenols in smoke (μ g)	Cresols in smoke (μ g)
Comparative Example 1	43.9	35.2
Example 1 (5 mg/rod)	38.0	30.8
Example 2 (10 mg/rod)	36.3	29.7
Example 3 (20 mg/rod)	29.6	24.8

[0062] As shown in Table 1 above, the amount of delivered phenol decreased in the smoking article filters of Examples 1 to 3 manufactured using the lyocell tow in which triacetin (TA) was dispersed, compared to the smoking article filter of Comparative Example 1 in which triacetin (TA) was not dispersed in the lyocell tow. Specifically, it can be seen that Examples 1 to 3 have an effect of reducing the amount of delivered phenol 20% to 45% or 25% to 44% compared to Comparative Example 1.

[0063] Also, it can be seen that a phenol reducing effect varies according to the content of triacetin (TA) dispersed in the lyocell tow. Specifically, it can be seen that, in the case of Example 3 in which lyocell tow having triacetin (TA) dispersed at 20 mg/rod therein was included, the amount of delivered phenol decreased 30% to 43%, that is, about 42%, compared to Comparative Example 1 and significantly decreased compared to Comparative Example 1 and Examples 1 and 2.

[0064] The above-described smoking article filter according to the present invention may be applied to a smoking article. FIG. 1 is a view illustrating a schematic configuration of a smoking article according to one embodiment of the present invention. The smoking article 100 includes the smoking material portion 10 and the filter portion 20, and the above-described smoking article filter may be applied to the filter portion 20 of the smoking article 100. In the smoking article 100, the smoking material portion 10 is located upstream of the filter portion 20.

[0065] The filter portion 20 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. The filter portion 20 may be manufactured using various materials or manufactured in various forms. The filter portion 20 according to one embodiment of the present invention basically includes the above-described smoking article filter including lyocell tow including a plurality of lyocell fibers and triacetin (TA) dispersed in the lyocell tow. The smoking article filter including the lyocell tow and triacetin (TA) may replace all or part of the filter portion 20 of existing smoking articles, and when the smoking article filter replaces part of the filter portion 20, a filter material that is used conventionally may be used together. For example, a cellulose acetate filter, a paper filter, a hollow tube filter, or the like may be used as the

conventional filter material.

[0066] The filter portion 20 is illustrated as a mono filter formed of a single filter in FIG. 1, but the present invention is not limited thereto. For example, 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.

[0067] In some embodiments, when the filter portion 20 is provided as a dual filter, a triple filter, or the like, the filter (hereinafter, "lyocell filter") of the present invention that includes lyocell tow including lyocell fibers and triacetin (TA) dispersed in the lyocell tow may be applied as any one filter of the plurality of filters, and a cellulose acetate filter and/or a paper filter may be applied as the other or another filter of the plurality of filters. In this case, a length of the lyocell filter of the present invention may be 25% to 50% of the overall length of the filter portion 20.

[0068] Also, although not illustrated in the drawings, the smoking article 100 may further include a hollow tube structure which is a tubular structure including a hollow therein. The hollow tube structure may be disposed downstream of the filter portion 20 including the lyocell filter.

[0069] In some embodiments, perforations may be formed in the hollow tube structure, but the present invention is not limited thereto. Perforations may not be formed in the hollow tube structure. In some embodiments, when perforations are formed in the hollow tube structure, the perforations may be formed at a position located 10 mm to 15 mm from the downstream end of the smoking article 100 in the upstream direction.

[0070] The exterior of the smoking material portion 10 and the filter portion 20 may be wrapped with a wrapper 30a or 30b.

[0071] The smoking material portion 10 may be wrapped with a smoking material portion wrapper 30a. Some of the cigarette smoke generated in a typical combustion process of the smoking material portion 10 is released into the atmosphere through the smoking material portion wrapper 30a before passing through the filter portion 20, and sidestream smoke gives an unpleasant feeling to people exposed thereto. There have been various attempts to reduce sidestream smoke such as filling conventional cigarette paper with a filler such as magnesium oxide, titanium oxide, cerium oxide, aluminum oxide, calcium carbonate, and zirconium carbonate. However, when sidestream smoke is reduced by simply applying such a filler, tobacco smoke taste degradation, combustion interruption, ash integrity degradation, or the like may occur, and it is difficult to address the above-mentioned problem through suitable combinations of materials contained in the filler. In some embodiments, a filler in which magnesium oxide (MgO and/or $\text{Mg}(\text{OH})_2$) and calcium carbonate (CaCO_3) are mixed may be applied to the smoking material portion wrapper 30a in order to prevent tobacco smoke taste degradation, ash integrity degradation, and combustion interruption while reducing sidestream smoke.

[0072] The filter portion 20 may be wrapped with a filter portion wrapper 30b. The filter portion wrapper 30b may be manufactured using grease-resistant wrapping paper, and an aluminum foil may be further included at an inner surface of the filter portion wrapper 30b. As described above, the filter portion wrapper 30b may have a basis weight of $90 \text{ mg} \cdot \text{m}^{-2}$ or less, but the present invention is not limited thereto.

[0073] 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 wrapped together with 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, at least a portion of the smoking material portion 10 and the filter portion 20 may be further wrapped with the tipping paper 40 and physically combined. According to one embodiment 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, 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.

[0074] 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 by 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:

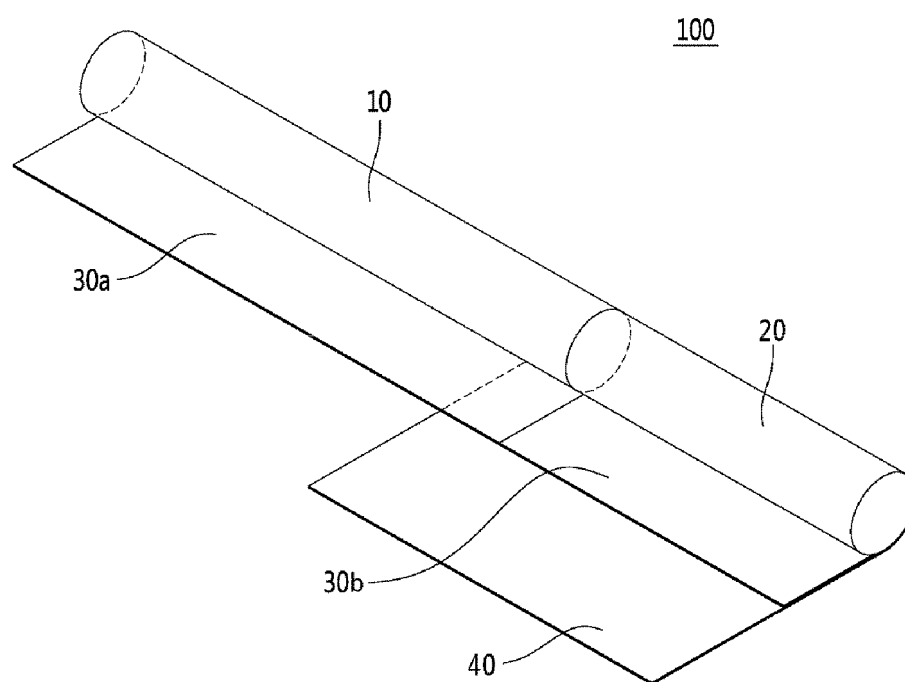
lyocell tow including lyocell fibers; and
a phenol reducing material dispersed in the lyocell tow,
wherein the phenol reducing material includes triacetin (TA).

2. The smoking article filter of claim 1, wherein the content of the triacetin (TA) ranges from 0.10 mg to 1.50 mg per length (mm) of the lyocell tow.
3. The smoking article filter of claim 2, wherein the content of the triacetin (TA) ranges from 0.5 mg to 0.85 mg per length (mm) of the lyocell tow.
4. The smoking article filter of claim 1, wherein the smoking article filter has a hardness ranging from 70% to 95%.
5. The smoking article filter of claim 1, wherein the lyocell fibers have a shaped cross-section.
6. The smoking article filter of claim 1, wherein:

the lyocell tow includes a plurality of lyocell fibers; and
the phenol reducing material does not include a material for binding the plurality of lyocell fibers to each other.
7. The smoking article filter of claim 1, wherein the triacetin (TA) is included in an amount ranging from 0.05 wt% to 20 wt% relative to the weight of the lyocell tow.
8. The smoking article filter of claim 7, wherein the triacetin (TA) is included in an amount ranging from 0.1 wt% to 15 wt% relative to the weight of the lyocell tow.
9. A smoking article comprising:

a smoking material portion;
a filter portion disposed downstream of the smoking material portion; and
a wrapper configured to wrap around the smoking material portion or the filter portion,
wherein the filter portion includes lyocell tow including lyocell fibers and a phenol reducing material dispersed in the lyocell tow, and
the phenol reducing material includes triacetin (TA).
10. The smoking article of claim 9, wherein the content of the triacetin (TA) ranges from 0.10 mg to 1.50 mg per length (mm) of the lyocell tow.
11. The smoking article of claim 9, wherein the triacetin (TA) is included in an amount ranging from 0.1 wt% to 15 wt% relative to the weight of the lyocell tow.

FIG. 1



INTERNATIONAL SEARCH REPORT

International application No.

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A. CLASSIFICATION OF SUBJECT MATTER

A24D 3/04(2006.01)i; A24D 3/06(2006.01)i; A24D 3/10(2006.01)i; A24D 3/02(2006.01)i; A24D 1/04(2006.01)i;
A24D 1/02(2006.01)i

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

A24D 3/04(2006.01); A24D 3/02(2006.01); A24D 3/06(2006.01); A24D 3/10(2006.01); D01D 5/088(2006.01);
D01F 2/00(2006.01); D01F 2/08(2006.01)

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Korean utility models and applications for utility models: IPC as above
Japanese utility models and applications for utility models: IPC as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

eKOMPASS (KIPO internal) & keywords: 흡연(smoking), 필터(filter), 라이오 셀(lyocell), 세그먼트(segment), 페놀(phenol)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2022-018180 A1 (DELFORTGROUP AG) 27 January 2022 (2022-01-27) See claims 1-24; and page 8.	1-3,6-11
Y		4,5
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☐ Further documents are listed in the continuation of Box C. ☒ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"D" document cited by the applicant in the international application	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"E" earlier application or patent but published on or after the international filing date	"&" document member of the same patent family
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search 21 May 2024	Date of mailing of the international search report 22 May 2024
Name and mailing address of the ISA/KR Korean Intellectual Property Office Government Complex-Daejeon Building 4, 189 Cheongsaro, Seo-gu, Daejeon 35208	Authorized officer
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