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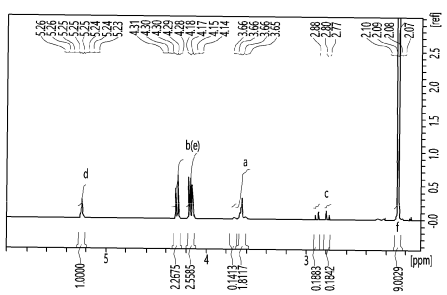
(54) SMOKING PRODUCT FILTER COMPRISING LYOCELL TOW THAT IS NOT CHEMICALLY MODIFIED, AND SMOKING PRODUCT COMPRISING SAME

(57) A smoking article filter and a smoking article including the same are provided. The smoking article filter includes lyocell tow including a plurality of lyocell fibers and a functional additive dispersed in the lyocell tow, wherein at least some of the plurality of lyocell fibers are not chemically modified by the functional additive.

FIG. 5



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Description

[Technical field]

[0001] The present disclosure relates to a smoking article filter including lyocell tow in which a functional additive is dispersed, and more particularly, to a smoking article filter that has excellent biodegradability because the lyocell fiber is not chemically modified by the functional additive despite the addition of the functional additive, and a smoking article including the same.

[Background Art]

[0002] Typical cigarette filters include cellulose acetate tow, which is obtained by extracting cellulose from wood pulp and acetylating the extracted cellulose. In addition, cigarette filters are assembled into tobacco products, distributed to consumers, provided for smoking, and finally discarded after smoking the cigarette. In addition, cigarette filters may be directly discarded as manufacturing residue from cigarette filter manufacturing plants. This cigarette filter waste is collected as waste and landfilled for disposal. In addition, in some cases, smoked cigarettes are not collected as waste and left in the natural environment.

[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, unlike cellulose acetate, the development of tow using lyocell fiber, which is made by fiberizing cellulose itself, is in progress.

[0004] When manufacturing smoking article filters, functional additives are added onto the tow to improve filter performance. For example, when manufacturing smoking article filters, phenol-related functional materials (or phenol-reducing materials) that may specifically reduce phenol-based materials generated during smoking are added to reduce phenol smoke components in mainstream smoke. Conventionally, it is known that phenol-related functional materials such as polyethylene glycol (PEG), triethyl citrate (TEC), and triacetin (TA) are added to cellulose acetate tow. When phenol-related functional materials consisting of PEG and TEC are added to hydrophobic cellulose acetate, phenol-related functional materials have the problem of lowering biodegradability by serving as a plasticizer for cellulose acetate fibers and bonding hydrophobic cellulose acetate fibers together.

[0005] Even when functional additives are added to highly biodegradable lyocell tow, the lyocell fiber is not chemically modified, so the need for a smoking article filter with excellent biodegradability is emerging. Further, there is a need for a method to accurately analyze whether lyocell fibers have not been chemically modified despite the application of functional additives.

[Disclosure]

[Technical Problem]

[0006] One object of the present disclosure is to provide a smoking article filter including lyocell tow in which a functional additive is dispersed, and more particularly, a smoking article filter that has excellent biodegradability because lyocell fibers that constitute lyocell tow are not chemically modified by the functional additive despite the addition of the functional additive.

[0007] Another object of the present disclosure is to provide a smoking article including a smoking article filter including lyocell tow in which a functional additive is dispersed, and more particularly, to a smoking article including a smoking article filter that has excellent biodegradability because lyocell fibers that constitute lyocell tow are not chemically modified by the functional additive despite the addition of the functional additive.

[Technical Solution]

[0008] A smoking article filter according to one embodiment for achieving the above object includes lyocell tow including a plurality of lyocell fibers and a functional additive dispersed in the lyocell tow, wherein at least some of the plurality of lyocell fibers are not chemically modified by the functional additive.

[0009] In some embodiments, the functional additive may be added onto the lyocell fibers in the process of forming the lyocell tow or added onto the lyocell tow in the process of forming the smoking article filter.

[0010] In some embodiments, the functional additive may include at least one phenol-reducing material.

[0011] In some embodiments, the at least one phenol-reducing material may include a first phenol-reducing material, a ^{13}C NMR spectrum obtained by ^{13}C NMR analysis of the lyocell tow in which the functional additive is dispersed may exhibit a first peak located within a first peak range, and the ^{13}C NMR spectrum obtained from the ^{13}C NMR analysis of the first phenol-reducing material may exhibit a second peak located within the first peak range.

[0012] In some embodiments, the first peak and the second peak may be the same.

[0013] In some embodiments, the ^{13}C NMR spectrum of the lyocell tow may be obtained by performing the ^{13}C NMR analysis on a first solution in which the lyocell tow in which the functional additive is dispersed is dissolved in an NMR solvent.

[0014] In some embodiments, the ^{13}C NMR spectrum of the lyocell tow in which the functional additive is dispersed may further exhibit a third peak located within a second peak range that is different from the first peak range, and the ^{13}C NMR spectrum obtained from the ^{13}C NMR analysis of the first phenol-reducing material may further exhibit a fourth peak located within the second peak range.

[0015] In some embodiments, the at least one phenol-reducing material may further include a second phenol-

reducing material, the ^{13}C NMR spectrum of the lyocell tow in which the functional additive is dispersed may further exhibit a third peak located within a second peak range that is different from the first peak range, and the ^{13}C NMR spectrum obtained from the ^{13}C NMR analysis of the second phenol-reducing material may exhibit a fourth peak located within the second peak range.

[0016] In some embodiments, the phenol-reducing material may include at least one of polyethylene glycol (PEG), triethyl citrate (TEC), and triacetin (TA).

[0017] In some embodiments, the functional additive may further include an emulsion.

[0018] In a smoking article including a smoking material portion, a filter portion, and a wrapper according to one embodiment for achieving the other object, the filter portion includes lyocell tow including a plurality of lyocell fibers and a functional additive dispersed in the lyocell tow, wherein at least some of the plurality of lyocell fibers are not chemically modified by the functional additive, the functional additive includes a phenol-reducing material, and the phenol-reducing material includes at least one of PEG, TEC, and TA.

[Advantageous Effects]

[0019] According to a smoking article filter according to one embodiment and a smoking article including the same, the present disclosure can provide a smoking article filter that can maintain the excellent biodegradability of lyocell fibers because the lyocell fibers are not chemically modified by a functional additive even though the functional additive including a phenol-reducing material with phenol reduction performance is dispersed in the lyocell tow, and a smoking article including the same.

[0020] In addition, according to a smoking article filter according to one embodiment and a smoking article including the same, the present disclosure can provide a smoking article filter having excellent biodegradability and excellent phenol reduction performance by dispersing a functional additive including a phenol-reducing material with phenol reduction performance in lyocell tow, and a smoking article including the same.

[0021] Further, when a phenol-reducing material is added onto lyocell tow, it can be clearly confirmed using NMR analysis that the lyocell fiber is not chemically modified.

[Description of Drawings]

[0022]

FIG. 1 is a diagram showing a schematic configuration of a smoking article according to one embodiment of the present disclosure.

FIG. 2 shows the NMR spectrum results of PEG 600 added to lyocell tow prepared in the embodiment, according to one embodiment of the present disclosure.

FIG. 3 shows the NMR spectrum results of TEC added to lyocell tow prepared in the embodiment, according to one embodiment of the present disclosure.

FIG. 4 shows the NMR spectrum results of TA added to lyocell tow prepared in the embodiment, according to one embodiment of the present disclosure.

FIG. 5 shows the NMR spectrum results of lyocell tow prepared by adding PEG 600, TEC, and TA in the embodiment, according to one embodiment of the present disclosure.

[Modes of the Invention]

[0023] 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 from 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 only make the technical spirit of the present disclosure complete and are provided to completely inform those of ordinary skill in the art to which the present disclosure pertains of the scope of the disclosure. The technical spirit of the present disclosure is defined only by the scope of the claims.

[0024] In assigning reference numerals to components of each drawing, it should be noted that the same reference numerals are assigned to the same components as much as possible even when the components are illustrated in different drawings. Also, in describing the present disclosure, when detailed description of a known related configuration or function is deemed as having the possibility of obscuring the gist of the present disclosure, the detailed description thereof will be omitted.

[0025] Unless otherwise defined, all terms including technical or scientific terms used in this specification 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 construed in an idealized or overly formal sense unless expressly so defined herein. Terms used in this specification are for describing the embodiments and are not intended to limit the present disclosure. In this specification, a singular expression includes a plural expression unless the context clearly indicates otherwise.

[0026] 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.

[0027] The terms "comprises" and/or "comprising" used herein specify the presence of mentioned components, steps, operations, and/or devices but do not preclude the presence or addition of one or more other components, steps, operations, and/or devices.

[0028] First, some terms used in this specification will be clarified.

[0029] In this 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 smokable products such as cigarettes, cigars, and cigarillos.

[0030] As used herein, "smoking material" may refer to any type of material that can be used in a smoking article.

[0031] In this 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.

[0032] In this specification, "longitudinal direction" may refer to a direction corresponding to a longitudinal axis of a smoking article.

[0033] Hereinafter, various embodiments of the present disclosure will be described in detail with reference to the accompanying drawings.

[0034] FIG. 1 is a diagram showing a schematic configuration of a smoking article according to one embodiment of the present disclosure. FIG. 2 shows the NMR spectrum results of PEG 600 added to lyocell tow prepared in the embodiment, according to one embodiment of the present disclosure. FIG. 3 shows the NMR spectrum results of TEC added to lyocell tow prepared in the embodiment, according to one embodiment of the present disclosure. FIG. 4 shows the NMR spectrum results of TA added to lyocell tow prepared in the embodiment, according to one embodiment of the present disclosure. FIG. 5 shows the NMR spectrum results of lyocell tow prepared by adding PEG 600, TEC, and TA in the embodiment, according to one embodiment of the present disclosure.

[0035] Throughout this specification, the term "smoking article" may refer to an article capable of generating an aerosol, such as tobacco (cigarettes) or cigars. The smoking article may include an aerosol-generating material or an aerosol-forming substrate. In addition, the smoking article may include a solid material based on tobacco raw materials, such as leaf tobacco, cut tobacco, and reconstituted tobacco. The smoking material may include volatile compounds.

[0036] In addition, throughout the 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. For example, in the smoking article 100 shown in FIG. 1, the smoking material portion 10 is located upstream or in an upstream direction of a filter portion for a smoking article (or smoking article filter portion 20 or filter portion 20).

[0037] Furthermore, in this specification, a case where the smoking article 100 is a combustion-type cigarette is described as an example, but the present disclosure is not limited thereto, and the smoking article 100 may also be a heating-type cigarette or the like used along with an aerosol generating device (not shown) such as an electronic cigarette device.

[0038] The present disclosure relates to the smoking article filter (or smoking article filter portion 20 or filter portion 20) included in the smoking article 100, the smoking article filter 20 according to one embodiment of the present disclosure includes lyocell tow including a plurality of lyocell fibers and a functional additive dispersed in the lyocell tow, wherein at least some of the plurality of lyocell fibers may not be chemically modified by the functional additive.

[0039] In this specification, 'not chemically modified' means that, even though a functional additive is added to lyocell tow, the plurality of lyocell fibers that make up lyocell tow are not chemically synthesized, chemically combined, or compositionally modified with the functional additive, so the chemical properties and characteristics of the lyocell fiber do not change. In other words, it may mean that the chemical properties and characteristics of the lyocell fibers included in lyocell tow to which functional additives have been added are the same as those of the lyocell fibers included in lyocell tow to which functional additives have not been added.

[0040] Because the lyocell tow included in the smoking article filter 20 according to the present disclosure is composed of a plurality of lyocell fibers corresponding to regenerated cellulose, which is a natural polymer that has not been chemically modified despite the addition of the functional additive, the characteristics of lyocell fiber, which has excellent biodegradability, are maintained, so the biodegradability of a smoking article filter including lyocell tow composed of these fibers may also be excellent.

[0041] In some embodiments, the functional additive may be added onto lyocell fibers in the process of forming lyocell tow, or may be added onto lyocell tow in the process of forming a smoking article filter using the lyocell tow. Without being limited thereto, when the functional additive is added onto lyocell fibers in the process of forming lyocell tow, it may be added by spraying it directly onto the surface of the lyocell fiber in a spray type manner. In addition, without being limited thereto, when the functional additive is added onto the lyocell tow in the process of forming a smoking article filter, it may be added by indirect spraying in a brush type manner.

[0042] In some embodiments, the functional additive

may include a phenol-related functional material. Without being limited thereto, the functional additive may further include an emulsion.

[0043] In some embodiments, the functional additive may include a phenol-related functional material, and the phenol-related functional material may be a phenol-reducing material. The term "phenol" may refer to a group of chemical compounds consisting of hydroxyl groups (-OH) directly bonded to an aromatic hydrocarbon functional group, and the phenol group includes phenol, catechol, m+p cresol, and o-cresol. The "phenol-reducing material" may correspond to a material that may specifically reduce at least one of phenol-based materials in smoke generated during smoking, such as phenol, catechol, m+p cresol, and o-cresol.

[0044] In some embodiments, the phenol-reducing material may include at least one of polyethylene glycol (PEG), triethyl citrate (TEC), and triacetin (TA).

[0045] When analyzing the ^{13}C NMR spectrum obtained by ^{13}C NMR spectroscopy (hereinafter, ^{13}C NMR analysis) of lyocell tow in which the functional additive including the phenol-related functional material according to one embodiment is dispersed, the ^{13}C NMR spectrum of lyocell tow according to one embodiment may exhibit a first peak located within a first peak range. In an exemplary embodiment, ^{13}C NMR analysis of the lyocell tow may be performed by performing ^{13}C NMR analysis on a first solution in which lyocell tow in which a functional additive including phenol-related functional materials is dispersed is dissolved in an NMR solvent and obtaining and analyzing a spectrum. The NMR solvent may include $CDCl_3$, but is not limited thereto, and the NMR solvent is not limited as long as it is a solvent that can perform NMR analysis.

[0046] In one embodiment, when analyzing the ^{13}C NMR spectrum obtained by ^{13}C NMR analysis of the phenol-related functional material included in the functional additive, the ^{13}C NMR spectrum of the phenol-related functional material may exhibit a second peak located within the first peak range. In some embodiments, the first peak and the second peak may be the same.

[0047] In an exemplary embodiment, ^{13}C NMR analysis of the phenol-related functional material can be performed by performing ^{13}C NMR analysis on a second solution in which phenol-related functional materials are dissolved in an NMR solvent and obtaining and analyzing a spectrum, and the NMR solvent may include $CDCl_3$.

[0048] As described above, the second peak appearing in the ^{13}C NMR spectrum of the phenol-related functional material may be located within the range of the first peak appearing in the ^{13}C NMR spectrum of the lyocell tow in which the functional additive including the phenol-related functional material is dispersed, and the first peak and the second peak may be the same. In other words, because the peaks appearing in the ^{13}C NMR spectrum of the phenol-related functional material remain the same before and after addition to lyocell tow, it can be confirmed that even though phenol-related functional materials are added to lyocell tow, the phenol-related functional materials are not chemically modified. In other words, because the phenol-related functional material added to lyocell tow is not chemically modified, it can be indirectly or directly confirmed that at least some of the plurality of lyocell fibers constituting the lyocell tow are not chemically modified by phenol-related functional materials.

[0049] In some embodiments, the phenol-related functional material included in the functional additive may include a plurality of phenol-reducing materials. When there are a plurality of phenol-reducing materials included in the functional additive dispersed in lyocell tow, the ^{13}C NMR spectrum for lyocell tow in which the functional additive including the plurality of phenol-reducing materials is dispersed may exhibit a plurality of peaks located within the peak range included in the 13C NMR spectrum of each of the plurality of phenol-reducing materials.

[0050] For example, when the phenol-related functional material included in the functional additive includes one phenol-reducing material, that is, when the phenol-related functional material included in the functional additive includes a first phenol-reducing material, the ^{13}C NMR spectrum for the lyocell tow in which the functional additive is dispersed may exhibit a peak range included in the 13C NMR spectrum of the first phenol-reducing material.

[0051] As another example, when the phenol-related functional material included in the functional additive includes a plurality of phenol-reducing materials, for example, when the phenol-related functional material included in the functional additive includes different first and second phenol-reducing materials, the ^{13}C NMR spectrum for lyocell tow in which functional additives including the first and second phenol-reducing materials are dispersed may exhibit both a first peak range appearing in the ^{13}C NMR spectrum of the first phenol-reducing material and a second peak range appearing in the ^{13}C NMR spectrum of the second phenol-reducing material.

[0052] Likewise, when the phenol-related functional material included in the functional additive includes different first, second, and third phenol-reducing materials, the ^{13}C NMR spectrum for lyocell tow in which functional additives including the first to third phenol-reducing materials are dispersed may exhibit a first peak range appearing in the ^{13}C NMR spectrum of the first phenol-reducing material, a second peak range appearing in the ^{13}C NMR spectrum of the second phenol-reducing material, and a third peak range appearing in the ^{13}C NMR spectrum of the third phenol-reducing material

[0053] In some embodiments, the phenol-reducing material included in the functional additive may include polyethylene glycol (PEG) with a molecular weight of 600, and the ^{13}C NMR spectrum of PEG 600 may exhibit a peak located within an a-th peak range (peak a) of 3.5 ppm to 4.0 ppm, 3.6 ppm to 3.8 ppm, 3.65 ppm to 3.78

ppm, 3.62 ppm to 3.75 ppm, or 3.65 ppm to 3.66 ppm.

[0054] In some embodiments, the phenol-reducing material included in the functional additive may include triethyl citrate (TEC), and the ^{13}C NMR spectrum of TEC may exhibit peaks located within a b-th peak range (peak b) of 4.0 ppm to 5.0 ppm, 4.05 ppm to 4.5 ppm, 4.1 ppm to 4.35 ppm, or 4.15 ppm to 4.33 ppm, and a c-th peak range (peak c) of 2.5 ppm to 3.0 ppm, 2.4 ppm to 3.0 ppm, 2.7 ppm to 2.95 ppm, or 2.79 ppm to 2.93 ppm.

[0055] In some embodiments, the phenol-reducing material included in the functional additive may include triacetin (TA), and the ^{13}C NMR spectrum of TA may exhibit peaks located within a d-th peak range (peak d) of 5.0 ppm to 5.5ppm, 5.1 ppm to 5.4 ppm, 5.2 ppm to 5.3 ppm, 5.22 ppm to 5.28 ppm, or 2.24 ppm to 5.26 ppm, an e-th peak range (peak e) of 4.0 ppm to 5.0 ppm, 4.05 ppm to 4.5 ppm, 4.1 ppm to 4.35 ppm, 4.12 ppm to 4.33 ppm, or 4.14 ppm to 4.31 ppm, and an f-th peak range (peak f) of 2.0 ppm to 2.5 ppm, 2.03 ppm to 2.2 ppm, 2.04 ppm to 2.15 ppm, 2.05 ppm to 2.13 ppm, or 2.07 ppm to 2.10 ppm.

[0056] Without being limited thereto, the e-th peak range (peak e) included in the ^{13}C NMR spectrum of TA may be included in the b-th peak range (peak b) included in the ^{13}C NMR spectrum of TEC.

[0057] In some embodiments, the ^{13}C NMR spectrum of the lyocell tow in which a functional additive including PEG 600 as a phenol-reducing material is dispersed may exhibit at least the a-th peak range.

[0058] In some other embodiments, the ^{13}C NMR spectrum of lyocell tow in which a functional additive including TEC as a phenol-reducing material is dispersed may exhibit at least the b-th peak range and the c-th peak range.

[0059] In some other embodiments, the ^{13}C NMR spectrum of lyocell tow in which a functional additive including TA as a phenol-reducing material is dispersed may exhibit at least the d-th peak range, the e-th peak range, and the f-th peak range.

[0060] In some other embodiments, the ^{13}C NMR spectrum of lyocell tow in which a functional additive including PEG600, TEC, and TA as phenol-reducing materials is dispersed may exhibit at least the a-th peak range, the b-th peak range (or the e-th peak range), the c-th peak range, the d-th peak range, and the f-th peak range.

[0061] Hereinafter, the ^{13}C NMR analysis of the phenol-reducing material and the lyocell tow in which the phenol-reducing material is dispersed will be performed to demonstrate that there is no chemical change in lyocell fibers due to the phenol-reducing material included in the functional additive.

<Experimental Example> ^{13}C NMR analysis

[0062] In order to analyze whether chemical changes in lyocell fibers are caused by functional additives, ^{13}C NMR analyses was performed on PEG 600, TEC, and TA, which can be included as phenol-reducing materials in functional additives, respectively, and a ^{13}C NMR analysis was performed on lyocell tow including a plurality of lyocell fibers and in which functional additives including PEG 600, TEC, and TA were dispersed.

[0063] Specifically, 2.1 mg of PEG 600 was added to 0.75 mL of $CDCl_3$ used as an NMR solvent, and then the NMR solution to which PEG 600 was added was subjected to ^{13}C NMR analysis (JEOL ECX 500), and the results are shown in the ^{13}C NMR spectrum in FIG. 2.

[0064] In addition, 2.5 mg of TEC was added to 0.75 mL of $CDCl_3$ used as an NMR solvent, and then the NMR solution to which TEC was added was subjected to ^{13}C NMR analysis (JEOL ECX 500), and the results are shown in the ^{13}C NMR spectrum in FIG. 3.

[0065] In addition, 2.5 mg of TA was added to 0.75 mL of $CDCl_3$ used as an NMR solvent, and then the NMR solution to which TA was added was subjected to ^{13}C NMR analysis (JEOL ECX 500), and the results are shown in the ^{13}C NMR spectrum in FIG. 4.

[0066] In addition, using lyocell tow in which 20 uL of a functional additive including 2.1 mg of PEG 600, 2.5 mg of TEC, and 2.5 mg of TA was added, a smoking article filter satisfying the conditions of a resistance to draw of 405 mmWG, a length of 108 mm, and a circumference of 24.2 mm was manufactured, 100 mg of the lyocell tow portion in which the functional additive was dispersed was extracted from the manufactured smoking article filter, the extracted lyocell tow was dissolved in 0.75 mL of $CDCl_3$ used as an NMR solvent for 10 hours, and the NMR solution was subjected to ^{13}C NMR analysis (JEOL ECX 500), and the results are shown in the ^{13}C NMR spectrum in FIG. 5.

[0067] Referring to FIGS 2 to 5, as a result of the experiment, it can be confirmed that an a-th peak range, a b-th peak range (or an e-th peak range), a c-th peak range, a d-th peak range, and an f-th peak range, which are the peak ranges appearing in the ^{13}C NMR spectra (see FIGS. 2 to 4) of the phenol-reducing materials (PEG 600, TEC, TA) that were not added to lyocell tow, appear in the ^{13}C NMR spectrum (see FIG. 5) of lyocell tow to which the phenol-reducing materials were added. As a result, it can be confirmed that PEG 600, TEC, and TA do not undergo chemical reactions such as substitution or bonding with the lyocell fibers, so no chemical changes occur. Therefore, it can be confirmed that since PEG 600, TEC, and TA dispersed in the lyocell tow did not change chemically, the lyocell fiber also did not change chemically.

[0068] The smoking article filter according to the present disclosure described above may be applied to a smoking article. FIG. 1 is a diagram showing a schematic configuration of a smoking article according to one embodiment of the present disclosure. The smoking article 100 includes a smoking material portion 10 and a filter portion 20, and the smoking article filter described above 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.

[0069] The smoking material portion 10 may be filled with a smoking material such as raw tobacco leaves, reconstituted tobacco leaves, or a mixture of tobacco leaves and reconstituted tobacco leaves. A processed smoking material may be filled in the smoking material portion 10 in the form of a sheet or shredded tobacco. 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 commonly used in the art in consideration of the filling amount of smoking material, user's preference, and the like. The smoking material portion 10 may include at least one aerosol-generating material selected from glycerin, propylene glycol, ethylene glycol, dipropylene glycol, diethylene glycol, triethylene glycol, tetraethylene glycol, and oleyl alcohol. The smoking mass portion 10 may contain other additives such as flavoring agents, humectants and/or acetate compounds. The aerosol-generating material and additives may be contained in the smoking material.

[0070] 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 just before the user inhales it. 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 disclosure basically includes the above-described smoking article filter including lyocell tow including a plurality of lyocell fibers and TEC dispersed on the lyocell tow. The smoking article filter including the lyocell tow and TEC can replace all or part of the filter portion 20 of existing smoking articles, and when replacing part of the filter portion 20, a filter material that is used conventionally may be used together. Existing filter materials may include, for example, cellulose acetate filters, paper filters, hollow tube filters, or the like.

[0071] In FIG. 1, the filter portion 20 is shown as a mono filter consisting of a single filter, but the present disclosure 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 to increase filter efficiency.

[0072] In some embodiments, when the filter portion 20 is provided as a dual filter, triple filter, or the like, one of the plurality of filters is a filter of the present disclosure (hereinafter referred to as lyocell filter) including lyocell tow including lyocell fibers and TEC dispersed in the lyocell tow, and the other filter(s) among the plurality of filters may be a cellulose acetate filter and/or a paper filter. In this case, a length of the lyocell filter of the present disclosure may be 25% to 50% of the total length of the filter portion 20.

[0073] In addition, although not shown in the drawings, the smoking article 100 may further include a hollow tube structure, which is a tubular structure including a hollow interior. The hollow tube structure may be disposed downstream of the filter portion 20 including the lyocell filter.

[0074] In some embodiments, perforations may be formed in the hollow tube structure, but the present disclosure 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.

[0075] The exterior of the smoking material portion 10 and the filter portion 20 may be wrapped with a wrapper 30a or 30b.

[0076] The smoking material portion 10 may be wrapped with a smoking material portion wrapper 30a. Some of the cigarette smoke generated during 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 is unpleasant to secondhand smokers. There have been various attempts to reduce sidestream smoke, such as adding fillers such as magnesium oxide, titanium oxide, cerium oxide, aluminum oxide, calcium carbonate, and zirconium carbonate to conventional cigarette paper. However, when sidestream smoke is reduced by simply applying such fillers, a smoking taste sensation is reduced, combustion is lost, and ash integrity is reduced, and it has been difficult to solve the above-mentioned problems through an appropriate combination of materials used in the filler. In some embodiments, the smoking material portion wrapper 30a may be filled with a mixture of magnesium oxide (MgO and/or $Mg(OH)_2$) and calcium carbonate ($CaCO_3$) in order to reduce sidestream smoke and at the same time prevent a decrease in smoking taste sensation, a decrease in ash integrity, and loss of combustion.

[0077] The filter portion 20 may be wrapped with a filter portion wrapper 30b. The filter portion wrapper 30b may be made of grease-resistant wrapping paper, and an aluminum foil may be further included on an inner surface of the filter portion wrapper 30b. As described above, the filter portion wrapper 30b may have a basis weight of 90 mg^{-2} or less, but is not limited thereto.

[0078] 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 joined and wrapped with tipping paper 40. As shown in FIG. 1, the tipping paper 40 may be wrapped around at least a portion (for example, a partial downstream area) of the smoking material portion wrapper 30a and the exterior of the filter portion wrapper 30b. In other words, at least a portion of the smoking material portion 10 and the filter portion 20 are further wrapped with tipping paper 40 and may be physically joined. According to one embodiment of the present disclosure, the tipping

paper 40 may be made of non-porous wrapping paper that has not been treated to be grease-resistant, but the present disclosure is not limited thereto. In addition, the tipping paper 40 may prevent the filter portion 20 from burning by including an incombustible material, but the present disclosure is not limited thereto.

[0079] 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, it should be understood that the embodiments described above are illustrative in all respects and not restrictive. The scope of protection of the present disclosure should be interpreted according to 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 a plurality of lyocell fibers; and
a functional additive dispersed in the lyocell tow, wherein at least some of the plurality of lyocell fibers are not chemically modified by the functional additive.

2. The smoking article filter of claim 1, wherein the functional additive is added onto the lyocell fibers in the process of forming the lyocell tow or added onto the lyocell tow in the process of forming the smoking article filter.

3. The smoking article filter of claim 1, wherein the functional additive includes at least one phenol-reducing material.

4. The smoking article filter of claim 3, wherein

the at least one phenol-reducing material includes a first phenol-reducing material,
a ^{13}C NMR spectrum obtained by ^{13}C NMR analysis of the lyocell tow in which the functional additive is dispersed exhibits a first peak located within a first peak range, and
a ^{13}C NMR spectrum obtained from the ^{13}C NMR analysis of the first phenol-reducing material exhibits a second peak located within the first peak range.

5. The smoking article filter of claim 4, wherein the first peak and the second peak are the same.

6. The smoking article filter of claim 4, wherein the ^{13}C NMR spectrum of the lyocell tow is obtained by performing the ^{13}C NMR analysis on a first solution in which the lyocell tow in which the functional additive is dispersed is dissolved in an NMR solvent.

7. The smoking article filter of claim 4, wherein

the ^{13}C NMR spectrum of the lyocell tow in which the functional additive is dispersed further exhibits a third peak located within a second peak range that is different from the first peak range, and
the ^{13}C NMR spectrum obtained from the ^{13}C NMR analysis of the first phenol-reducing material further exhibits a fourth peak located within the second peak range.

8. The smoking article filter of claim 4, wherein

the at least one phenol-reducing material further includes a second phenol-reducing material,
the ^{13}C NMR spectrum of the lyocell tow in which the functional additive is dispersed further exhibits a third peak located within a second peak range that is different from the first peak range, and
the ^{13}C NMR spectrum obtained from the ^{13}C NMR analysis of the second phenol-reducing material exhibits a fourth peak located within the second peak range.

9. The smoking article filter of claim 3, wherein the phenol-reducing material includes at least one of polyethylene glycol (PEG), triethyl citrate (TEC), and triacetin (TA).

10. The smoking article filter of claim 3, wherein the functional additive further includes an emulsion.

11. A smoking article comprising a smoking material portion, a filter portion, and a wrapper,

wherein the filter portion includes lyocell tow including a plurality of lyocell fibers and a functional additive dispersed in the lyocell tow,
at least some of the plurality of lyocell fibers are not chemically modified by the functional additive,
the functional additive includes a phenol-reducing material, and
the phenol-reducing material includes at least one of polyethylene glycol (PEG), triethyl citrate (TEC), and triacetin (TA).

FIG. 1

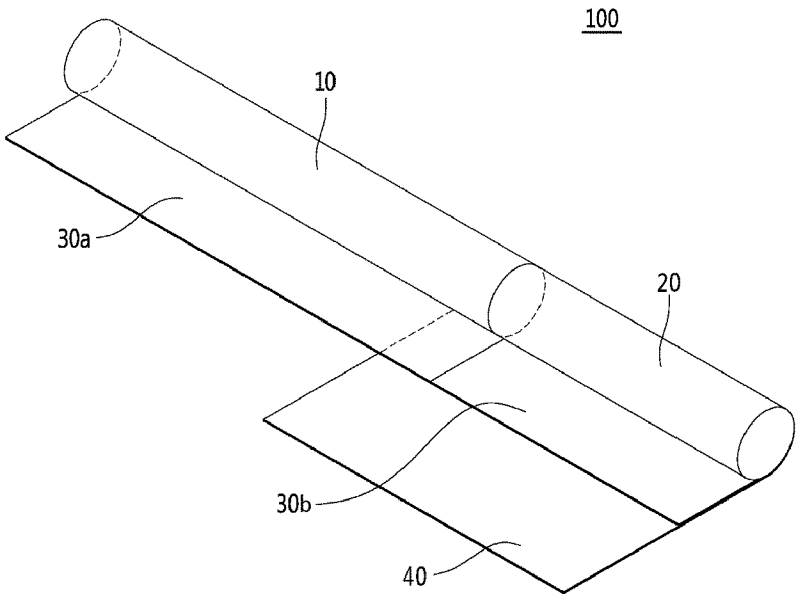
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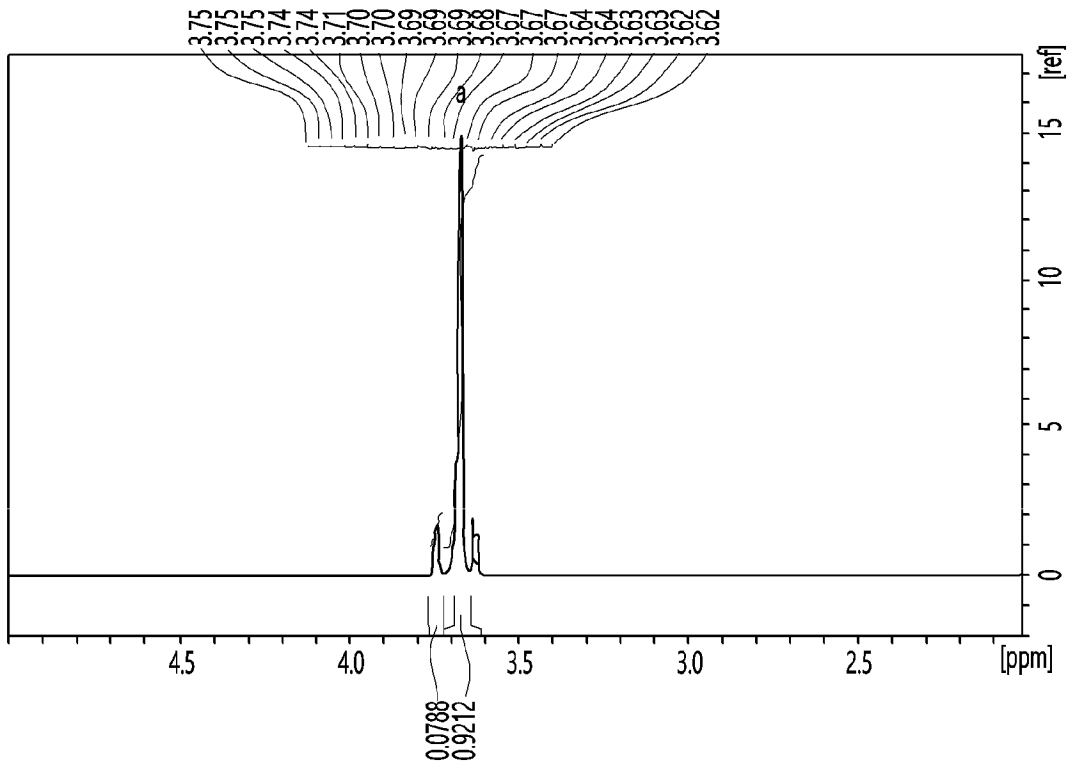
FIG. 2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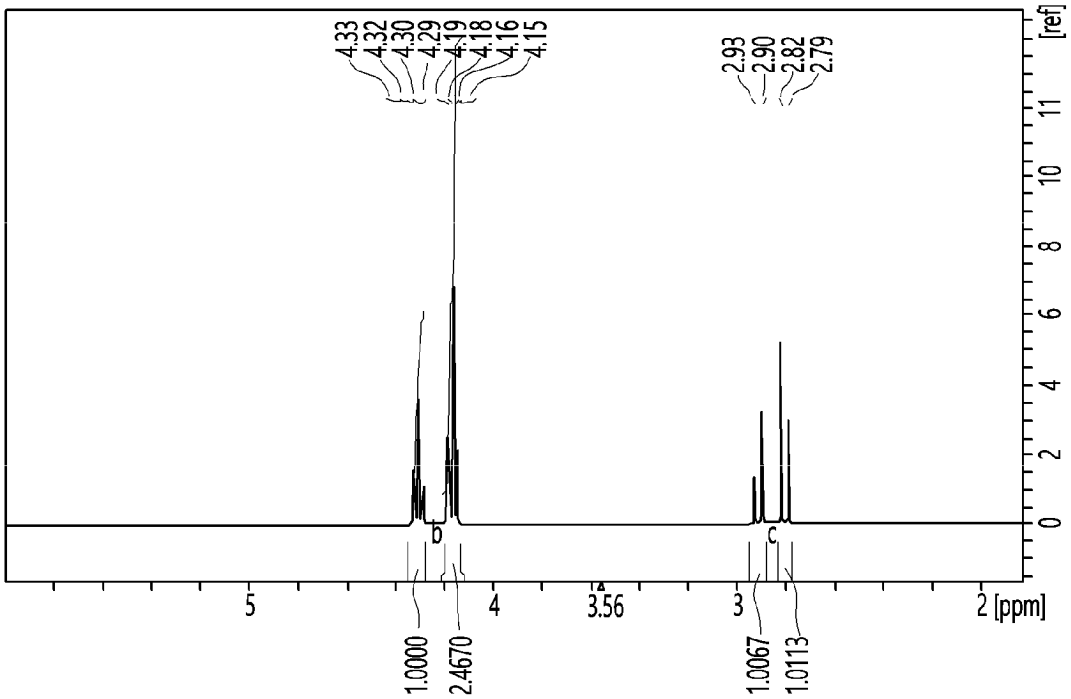
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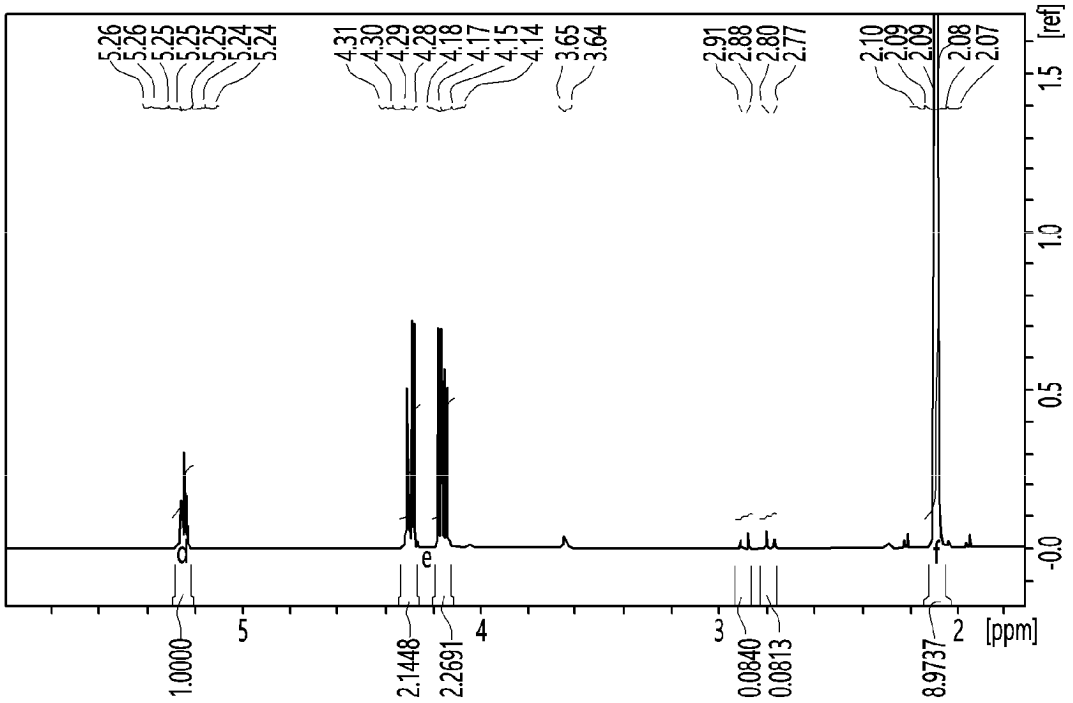
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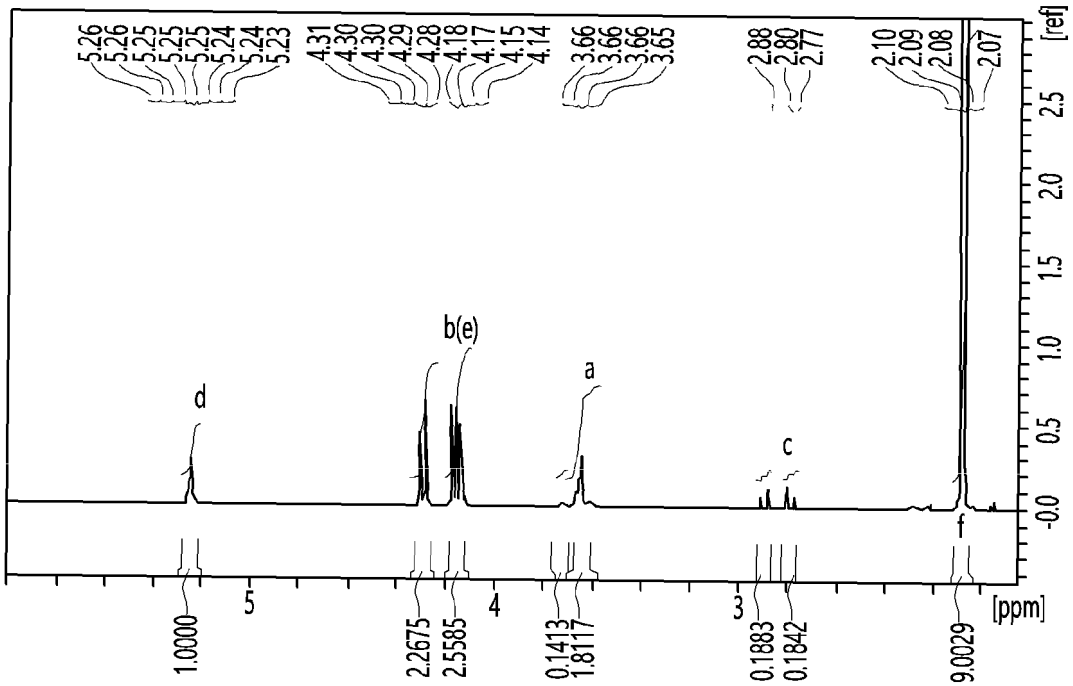
FIG. 5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9.0029

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR2024/001603

A. CLASSIFICATION OF SUBJECT MATTER

A24D 3/06(2006.01)i; **A24D 3/10**(2006.01)i; **A24D 3/08**(2006.01)i; **A24D 1/04**(2006.01)i; **A24D 3/14**(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 3/06(2006.01); A24D 3/02(2006.01); A24D 3/04(2006.01); A24D 3/08(2006.01); A24D 3/10(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: 필터(filter), 라이오셀(lyocell), 트리에틸시트레이트(triethyl citrate), 트리아세틴(triacetin), 폴리에틸렌 글리콜(polyethylene glycol), NMR, 분석(analysis)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	WO 2022-018180 A1 (DELFORTGROUP AG) 27 January 2022 (2022-01-27) See claims 1, 7 and 9; page 8, line 35-page 9, line 4 and page 17, lines 4-17.	1-11
Y	KR 10-2016-0041664 A (KT & G CORPORATION et al.) 18 April 2016 (2016-04-18) See paragraphs [0031]-[0037] and [0063]-[0068].	1-11
A	KR 10-2017-0002778 A (HUVIS CORPORATION) 09 January 2017 (2017-01-09) See entire document.	1-11
A	KR 10-2019-0048385 A (KT & G CORPORATION) 09 May 2019 (2019-05-09) See entire document.	1-11
A	KR 10-2016-0104962 A (KT & G CORPORATION et al.) 06 September 2016 (2016-09-06) See entire document.	1-11

☐ Further documents are listed in the continuation of Box C. ☑ See patent family annex.

* Special categories of cited documents:
"A" document defining the general state of the art which is not considered to be of particular relevance
"D" document cited by the applicant in the international application
"E" earlier application or patent but published on or after the international filing date
"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
"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
"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
"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
"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
22 May 2024	**22 May 2024**
Name and mailing address of the ISA/KR **Korean Intellectual Property Office** **Government Complex-Daejeon Building 4, 189 Cheongsa-ro, Seo-gu, Daejeon 35208** Facsimile No. **+82-42-481-8578**	Authorized officer Telephone No.

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INTERNATIONAL SEARCH REPORT
Information on patent family members

International application No.
PCT/KR2024/001603

Patent document cited in search report	Publication date (day/month/year)	Patent family member(s)	Publication date (day/month/year)
WO 2022-018180 A1	27 January 2022	CN 116133538 A	16 May 2023
		EP 4064884 A1	05 October 2022
		JP 2023-534469 A	09 August 2023
		KR 10-2023-0043104 A	30 March 2023
		US 2023-0284678 A1	14 September 2023
KR 10-2016-0041664 A	18 April 2016	None	
KR 10-2017-0002778 A	09 January 2017	None	
KR 10-2019-0048385 A	09 May 2019	None	
KR 10-2016-0104962 A	06 September 2016	None	

Form PCT/ISA/210 (patent family annex) (July 2022)