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(54) **COMPOSITE FILTER COMPRISING BIOLOGICAL COMPOSITION**

VERBUNDFILTER MIT EINER BIOLOGISCHEN ZUSAMMENSETZUNG

FILTRE COMPOSITE COMPRENANT UNE COMPOSITION BIOLOGIQUE

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The file contains technical information submitted after the application was filed and not included in this specification

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Description**Technical Field**

[0001] This invention involves a type of composite filter tips containing biological composition, more specifically, the application of biological composition composed of cobalt porphyrin and ginkgo leaf extract to the filter tip, which belongs to the processing technology of filter tip additive and filter tip.

Background Art

[0002] The filter tip is used for filtering the harmful substances in smoke, with the tar removal rate of about 35%. The existing fiber filter rod consists mainly of either acetate tow or polypropylene tow, and its filtration efficiency depends on molecular structure and physicochemical properties. The above-mentioned two materials, limited by the structure and physicochemical properties, have defects in filtration efficiency. The acetate tow carries negative charge, while lots of particles in smoke (about $2 \times 10_9$ negative charge particles per 1ml smoke) also carry the negative charge. As the same charges repel each other, such filter tip removes particulate matter in smoke by means of mechanical restriction and diffusion deposition; as a result of no active group, part polar structure in the tow has a certain affinity for only the highly polar matters containing oxygen atoms, such as aldehyde ketone and lactone (carboxyl compounds) as well as furan and phenolic compound (heterocyclic compounds), and thus filters selectively the matters. However, the acetate tow has a low absorbing capacity for harmful carbon radical, aromatic hydrocarbon, propylene (lowly polar compound) and trace metal element in the smoke. Furthermore, the polypropylene tow is a high molecular saturated alkane compound and free from the negative charge group; its molecular structure is stable, and its physicochemical properties are inert; its hydrophobic group is of the nonpolar structure, and there is no polar structure with a strong affinity for polar smoke components; change of pressure drop will not impact on selective filtration of the polar smoke components. Accordingly, the polypropylene tow has low remove efficiency for polar components and low-boiling spicy miscellaneous gas molecules in the smoke.

[0003] It is well known that the smoke contains many harmful ingredients, especially possibly cancerogenic free radical, condensed aromatics and tobacco specific nitrosamine, all of which cannot be removed effectively by the above traditional filter tips.

[0004] To this end, a type of filter tips with strengthened functions is needed. Adding the composition to filter tip aims to not only remove selectively the harmful ingredients in smoke, but also make the harmless flavor components in smoke pass smoothly the filter tip. In addition, such new filter tip also requires convenient production, low production cost and easy realization of industrialization.

[0005] The porphyrins are of unique structure. Specifically, its molecule is rigid and has large face; position and direction of its edge functional group can be controlled so that molecular size, molecularity, functional group and chiral isomer can be identified effectively. At present, the porphyrins have been applied in chromatographic fractionation analysis, sensor, artificial enzyme analysis and receptor building in the field of analytical chemistry. For chromatographic analysis, stationary phase of porphyrin derivatives has been successfully applied in HPLC and CE etc. Kibbey etc. (Kibbey CE, Meyerhoff ME. Anal Chem, 1993, 65(17): 2189-2196.) synthesized for the first time the stationary phase of porphyrins, such as H₂CPTTP, SnCPTTP and InCPTTP, which was used successfully for separation of PAHs. Then ProP-silica stationary phase (Xiao J, Kibbey CE, Coutant DE, et al. J Liq Chromatogr Rel Technol, 1996, 19:2901- 2932.) and MProP-silica stationary phase (Chen S, Meyerhoff ME. Anal Chem, 1998, 70(13): 2523- 2529.) were prepared to obtain better selectivity of molecular shape. Those stationary phases, more stable than stationary phase of fibers, are used for research of pre-enrichment carcinogenicity PAHs. The principle of good identifiability of PAHs by porphyrins is that PAHs rich in π electrons has strong π - π interaction with porphyrins. Such interaction has not only the face-to-face π - π interaction but also the face-to-edge one (Chen S, Fetzer JC, Meyerhoff ME. Fresenius J Anal Chem, 200 1(3-4):385-392. Yutaka S, Masaki M, Junichi O, et al. Anal Sci, 1991, 7(5):805-806. Mifune M, Shimomura Y, Saito Y, et al. Bull Chem Soc Jpn, 1998, 71(8): 1825- 1829.).

[0006] As Chinese herbal medicine, the ginkgo leaf extract has been used for thousands of years in China. The internationally recognized ginkgo leaf extract contains over 24% flavonoid and over 6% lactone. The research shows that the main active constituent with antioxidative effect in ginkgo leaf extract is the flavonoid and the lactone has no obvious antioxidative effect (Mou Lingli etc., Chemical Constituents in Ginkgo Leaf and Their Antioxidative Activity, Chinese Journal of Natural Medicines, 2008, 6(1): 26-29.), and that the reductive hydroxyl (-OH) functional group in the molecule can play a direct role in antioxidative effect. Quercetin in flavonoid, serving as a hydrogen atom donor, can interdict and terminate the free radical chain reaction, remove directly free radicals and hydrogen peroxide, antagonize effectively the destroy of free radicals on unsaturated fatty acid, reduce content of lipidic peroxide, and enhance activity of the superoxide dismutase (Li Yuhua etc., Action of Ginkgo Leaf Extract [J]. Chinese Health Care, 2008, 16(11):529.).

[0007] The chemiluminescent method determines the O₂[·] removal effect by flavonoid. The research on relations

between its structure and $O_2\cdot$ removal activity proves that 4'-OH and 2, 3 double bond are the main activity parts of removing $O_2\cdot$ (Zou Yaohong etc., The Research on Property of Flavonoid to Remove Active Oxygen Free Radical [J]. Journal of Changshu College, 2001, 15(2):47-50.), and that 3', 4'- ortho dihydroxyl is the key structure of removing activity of free radicals while hydroxyls on the rest positions also play a role (Hu Chun etc., Research with Chemiluminescent Method on $O_2\cdot$ and $\cdot OH$ Removal by Flavonoid, Journal of Wuxi University of Light Industry, 1996, 15(3):194-198.).

[0008] Structural factors of flavonoids for antioxidative activity are researched by the semi-empirical calculation methods of structural chemistry and quantum chemistry, and the relative results are described in the following. ① The energy Δ HOF required for forming semiquinone free radicals within molecule is low, and the free radical formed is stable, thus the antioxidative activity is strong.

② Uniform distribution of electron spin density is crucial for strong antioxidative activity. For the semiquinone free radical formed by flavone containing ortho-diphenol- hydroxyl, electron spin density is distributed evenly, and semiquinone group in molecule and hydrogen bond in molecule shaped by ortho phenolic hydroxyl make the system energy level decrease, so the antioxidative activity of flavonoid containing ortho-diphenol- hydroxyl is better than that containing meta-diphenol- hydroxyl. ③ Amount of phenolic hydroxyl in molecule and that of intramolecular H-bond are in positive correlation with antioxidative activity of the molecule, which contributes to an important factor of strong antioxidative activity of the flavonoid. (Zhao Jihong etc., Structural Factors of Flavonoids for Antioxidative Activity, Journal of North China University of Technology, 2001,13(1):36-44.) Antioxidative activity of flavonoids can be improved by means of changing hydroxyl substitute, making distribution of electron spin density for semiquinone free radical more uniform, increasing the amount of phenolic hydroxyl in flavonoids and of intramolecular hydrogen bonds by chemical modification.

[0009] The porphyrins with unique structure are characterized by good selectivity and separating property when condensed aromatics and Fuller hydrocarbon etc. are determined by solid phase of HPLC; the ginkgo leaf extract has good antioxidative activity. Therefore, the composition of porphyrins and ginkgo leaf extract, if used in the filter tip, can remove effectively the harmful ingredients, and thus the filter tip with strengthened functions comes into being.

[0010] WO 03/053179 A1 discloses cigarette filters containing lipophile flavonoids and/or tocopherols and tocotrienols.

Contents of the Invention

[0011] This invention aims to provide a type of filter tips with high removal efficiency of harmful substances in smoke, so as to reduce smoking harm on human body.

[0012] As for the invented filter tip, the carrier adhering to the biological composition is added to the tow filter rod to make the composite filter tip. The biological composition is composed of cobalt porphyrin and ginkgo leaf extract.

[0013] This invention includes the following:

1. A type of composite filter tips containing biological composition, which contains a biological composition adhering to the carrier, and which is added to the tow filter rod when the rod is made. The biological composition consists of cobalt porphyrin and ginkgo leaf extract.

2. In detail: it is the dual composite filter which is made from the tow filter rod with biological composition and that without biological composition.

3. In detail: the mass ratio of cobalt porphyrin to ginkgo leaf extract is 1:1~80; ratio of mass of the biological composition to the carrier is 0.1‰~5.0‰; the addition of the carrier with biological composition in the tow filter rod is 3-30mg/cigarette.

4. In detail: the mass ratio of cobalt porphyrin to ginkgo leaf extract is 1:1~50.

5. In detail: the mass ratio of cobalt porphyrin to ginkgo leaf extract is 1:1~10.

6. The methods of preparing the composite filter tip containing biological composition, including the following steps:

(1) The biological composition of cobalt porphyrin and ginkgo leaf extract is prepared and then dissolved in ethanol. In addition, a polyvinylpyrrolidone is added to the ethanol solution containing biological composition and mixed up.

(2) The mixture in Step (1) adheres to the carrier.

(3) The carrier in Step (2) is added evenly when tow filter rod is made.

(4) Then the tow filter rod with the composition and one without the composition are rolled with the inner coil paper respectively.

(5) Finally, tow filter rods are made into the filter tip with outer coil paper on the composite filter tip maker.

7. Application of the above composite filter tip containing biological composition to the cigarette The relative tests in the following:

a. Interaction of cobalt porphyrin and 3, 4-benzopyrene [a] is determined by fluorescence quenching method.

Polycyclic aromatic hydrocarbon always has characteristic photoluminescence excitation spectrum and fluorescence emission spectrum, so the interaction of cobalt porphyrin and 3, 4-benzopyrene [a] is determined by fluorescence quenching method. The result shows that, with the increase of cobalt porphyrin concentration, fluorescence intensity of

3, 4-benzopyrene [a] decreases, and fluorescence spectrum has red shift (see Attached Figure 1), which proves that 3, 4-benzopyrene [a] and cobalt porphyrin interact.

b. Interaction of cobalt porphyrin and tobacco specific nitrosamine is determined by ultraviolet spectrophotometry.

The porphyrins have the characteristic of ultraviolet absorption and characteristic absorption peak near 413nm, so the interaction of cobalt porphyrin and tobacco specific nitrosamine (TSNAs, NNN, NAB, NNK, NAT) is determined by ultraviolet spectrophotometry. The result shows that intensity of characteristic absorption peak (413nm) of porphyrins decreases after TSNAs is added, and the intensity will decrease gradually along with increasing concentration of TSNAs; new composite characteristic peak (438nm) appears and its intensity increases gradually along with increasing concentration of TSNAs; ultraviolet spectrum has red shift (see the Attached Figure 2); the binding constant (K) with NNN, NAB, NNK and NAT is $1.4 \times 10_4$, $1.1 \times 10_4$, $5.8 \times 10_3$ and $3.4 \times 10_3$ respectively, and order of the binding capacity is NNN, NAB, NNK and NAT. The above proves that porphyrin and TSNAs generate a new composition and interact strongly.

c. The release of free radical, 3, 4-benzopyrene [a] and tobacco specific nitrosamine in smoke is determined.

For the blank control cigarette and the cigarette with the invented filter tip, releasing quantity of free radical, 3, 4-benzopyrene [a] and tobacco specific nitrosamine in smoke is determined, and filtration efficiency is calculated, see Table 1. According to the table, harmful ingredients in smoke of cigarette with the invented filter tip, compared with those in the blank control cigarette, reduce by 30.36%~66.89%.

Table 1 Determination Results and Filtration Efficiency of Harmful Ingredients in Smoke

	Gas-phase free radical (relative unit)	Solid-phase free radical (relative unit)	4-benzopyrene [a] (ng/ cigarette)	NNK (ng/ cigarette)	NNN (ng/ cigarette)	NAB (ng/ cigarette)	NAT (ng/ cigarette)
No.1	8.73.	8.31	14.50	5.50	9.09	1.07	11.74
No.2	6.08	5.60	9.80	3.30	3.01	0.43	6.53
Reduction rate (%)	30.36	32.61	32.41	40.00	66.89	59.81	44.38

Note: No.1 is the cigarette without biological composition (blank control cigarette); No.2 is the cigarette with biological composition, and mass ratio of cobalt porphyrin to ginkgo leaf extract: 1:3.

NNK:4-(methylnitrosamino)-1-(3-pyridyl)-1-butanone;NNN:N-nitrosornicotine;NAB: N-nitrosoanabasine; NAT: N-nitrosoanatabine

d. Biological test

Toxicity of the blank control cigarette and the cigarette with the invented filter tip is tested, and the result proves that mutagenicity and toxicity of the latter are lower than those of the former.

(a) Salmonella typhimurium/ mammal microsome enzyme test (Ames test) Ames test results are listed in Table 2. Three doses from 100 to 500 in the table have inhibitory action, and the mutagenicity reduces.

Table 2 Results of Sample Mutagenesis with Ames Test Incorporating Method ($X \pm SD$) ($+S_9$)

Groups	Tested tar dose ($\mu\text{g}/\text{vessel}$)	Colony number of reverse mutation (number/vessel)	Inhibition rate (%)
No.1	100	64.8 ± 11.8	
	300	83.2 ± 12.0	
	500	107.2 ± 9.7	
No.2	100	42.8 ± 10.0	49.66
	300	53.2 ± 9.8	47.85
	500	70.4 ± 10.5	42.45
Solvent+ S_9		20.5 ± 2.4	

(b) Acute toxicity test of passive smoking and observation of pulmonary histopathology of mice

Reaction of mice during the test is detailed in the following. The mouse smoking No.1 cigarette is excited and active for the first ten cigarettes and then quiet. In the process of smoking, its ears, mouth, toes and tail are subject to hyperemia, and it scurries about and twitches before death. But the mouse smoking No.2 cigarette has longer quiet time, delayed death and calm breath, while hyperemia of its ears, mouth, nose, throat, toes and tail is less obvious than that of the mouse smoking No.1. Survival rate, median lethal dose and lethal dose for the cigarette with the invented filter tip are

higher than those of the blank control cigarette, and smoke toxicity of the former also reduces. (Table 3).

Table 3 Results of Acute Toxicity of the Mouse with Passive Smoking

Groups	Number of tested mice	Survival rate (%)	Median lethal dose(cig)	Lethal dose(cig)
No.1	60	33.3	49	35
No.2	60	40.0	54	44

After the acute toxicity test of passive smoking is completed, histopathology of mice is observed. Lung tissues and small veins of 100% mice smoking the blank control cigarette and only 46.7% mice smoking the cigarette with the invented filter tip are subject to hyperemia.

(c) Toxicity test of neutrophil erythrocyte

According to Table 4, median lethal dose of tar for No.1 and No.2 is 141.42 μ g/ml and 213.35 μ g/ml respectively, so cytotoxicity of tar in the invented filter tip is much lower than that of the blank control group.

Table 4 Test Results of Neutrophil Erythrocyte Toxicity

Groups	Median lethal dose (LD ₅₀ , μ g/ml)
No.1	141.42
No.2	213.35

(d) Subchronic toxicity test

The rats are weighted by balance respectively after passive smoking for 30 days. Three groups, including the negative control, are not found obvious weight changes and not reach the significance level. Then rats are killed to obtain their respiratory tract and lung for pathology observation. It is found that periacinar emphysema of rats smoking No.1 cigarette is serious while that smoking No. 2 cigarette is mild. Sternum marrow of rats, whose blood samples are taken, is collected for micronucleus test, and the test results are shown in the Table 5. The tar-induced micronucleus frequency of the blank control group, No. 1 Group and No.2 Group is 2.33‰, 5.00‰ and 3.92‰ respectively. Compared with the blank control, the positive result is reached, but there is no significant difference between No.1 and No.2. That is to say, no new toxicity and side effects appear after the biological composition is added into the filter tip which can alleviate injury of lung to a certain degree.

Table 5 Frequencies of Micronucleated Polychromatic Erythrocytes in Mouse Bone Marrow

Groups	Number of Cell observed	Number of micronuclei	Micronuclear rates (‰)
Blank group (negative control)	12000	28	2.33
No.1	12000	60	5.00
No.2	12000	47	3.92

Description of Figures

[0014] Test results of this invention and structural representation of filter tip are described in the following.

Figure 1 is the spectrogram on interaction of porphyrins and benzopyrene, $K_{sv} = (5.27 \pm 0.31) \times 10^5$.

Figure 2 is the spectrogram on interaction of porphyrins and TSNAs, (A), (B), (C) and (D) are the spectrogram on interaction with NNN, NAB, NNK and NAT respectively, of which B-H and B-L are spectrum curves for NNN, NAB, NNK and NAT with increasing concentration in cobalt porphyrin.

Figure 3 is the structural representation of dual composite filter.

Mode of Carrying Out The Invention

[0015] This invention will be further specified with Figure 3 in the following.

The dual composite filter in this invention consists of tow filter rod 1 (the biological composition adheres to the carrier, and then such carrier is added evenly to the tow filter rod when the rod is made.), tow filter rod without biological composition 2, inner coil paper 3 and outer coil paper 4, and its main characteristic is that the carrier with biological composition is added evenly to the tow filter rod.

[0016] This invention is achieved in this way:

A certain amount of cobalt porphyrin and ginkgo leaf extract is dissolved in 95% ethanol, and polyvinylpyrrolidone is added and mixed up. The solution in a certain proportion adheres to the carrier and then evenly added to the tow filter rod 1 to get the dual composite filter.

[0017] In detail: mass ratio of cobalt porphyrin to ginkgo leaf extract is 1:1~80, 1:1~50 (better), 1:1~30 (much better), or 1:1~10 (best).

[0018] In detail: the ratio of biological composition to ethanol is 1g biological composition: 10-100ml ethanol, 1g biological composition: 10-50ml ethanol (better), or 1g biological composition: 10-20ml ethanol (best).

[0019] In detail: mass ratio of polyvinylpyrrolidone to biological composition is 1:1~50, 1:1~20 (better), or 1:1~10 (best).

[0020] In detail: the carrier is active carbon, green plant particle and silicate.

[0021] In detail: the ratio of mass of the biological composition to the carrier is 0.1‰~5.0‰.

[0022] In detail: the addition of the carrier with biological composition added to the tow filter rod is 3-30mg/cigarette.

[0023] In detail: the adding method is that the carrier with biological composition falls to the tow filter rod so as to control quantity of the barrier.

[0024] In detail: the tow filter rod may be acetate tow, polypropylene tow, or made of other materials.

[0025] In detail: the carrier with biological composition is evenly added when the tow filter rod is made. The tow filter rod 1 with biological composition and tow filter rod 2 without biological composition respectively are made by inner coil paper 3. On the composite filter maker, two rods are made into the dual composite filter by outer coil paper 4.

[0026] Finally, the dual composite filter integrates by cork with the cut tobacco wrapped by coil paper on cigarette maker, and the rod 1 is placed between the rod 2 and cut tobacco.

[0027] Cobalt porphyrin used in this invention, at the content of 96%, is purchased from ALFA, while ginkgo leaf extract, containing 24% flavone and 6% lactone, is purchased from Ningbo Liwah Pharmaceutical CO.,LTD.

[0028] The technical scheme described above and the specific processing steps listed in the following for preparing the dual composite filter are also applicable to the multiple composite filter made from many filter rods.

[0029] Implementation Example: 5.0g cobalt porphyrin and 15.0g ginkgo leaf extract are weighed and dissolved in 400ml 95% ethanol, besides, added with 5g polyvinylpyrrolidone, mixed up, and which adheres to 40kg carrier. Then such carrier of 6mg/cigarette is added to the tow filter rod to make the dual composite filter, and the cigarette is made. Results of sensory evaluation, harmful ingredients test in smoke and biological test prove that the cigarette with the invented filter tip is characterized in consistent smoke well, reduced stimulation and tasty flavor; effect of releasing quantity decrease of harmful ingredients in smoke and biological test conform to the invention descriptions.

[0030] The above implementation scheme has expounded this invention, but other implementation schemes are also possible. Consequently, nature and scope of the Claims should not be limited to descriptions of this implementation scheme in the present disclosure.

Claims

1. A type of composite filter tips containing biological composition, which is **characterized in that** the biological composition adheres to a carrier, which is added to the tow filter rod when the rod is made, and the biological composition consists of cobalt porphyrin and ginkgo leaf extract.

2. A type of composite filter tips containing biological composition according to Claim 1, which is **characterized in that** it is the dual composite filter which is made from the tow filter rod with biological composition and the tow filter rod without biological composition.

3. A type of composite filter tips containing biological composition according to Claim 1, which is **characterized in that** mass ratio of cobalt porphyrin to ginkgo leaf extract is 1:1~80; ratio of mass of the biological composition to the carrier is 0.1‰~5.0‰; the addition of the carrier with biological composition in the tow filter rod is 3-30mg/cigarette.

4. A type of composite filter tips containing biological composition according to Claim 3, which is **characterized in that** mass ratio of cobalt porphyrin to ginkgo leaf extract is 1:1~50.

5. A type of composite filter tips containing biological composition according to Claim 4, which is **characterized in that** mass ratio of cobalt porphyrin to ginkgo leaf extract is 1:0~10.

6. A method of preparing the composite filter tip containing biological composition, including the following steps:

(1) The biological composition of cobalt porphyrin and ginkgo leaf extract is prepared and dissolved in ethanol.

In addition, a polyvinylpyrrolidone is added to the ethanol solution containing biological composition and mixed up.

(2) The mixture in Step (1) adheres to the carrier.

(3) The carrier in Step (2) is added evenly when tow filter rod is made.

(4) Then the tow filter rod with the composition and one without the composition are rolled with the inner coil paper respectively

(5) Finally, tow filter rods are made into the filter tip with outer coil paper on the composite filter tip maker.

7. A method of preparing the composite filter tip according to Claim 6, which is **characterized in that** the biological composition consists of cobalt porphyrin and ginkgo leaf extract; mass ratio of cobalt porphyrin to ginkgo leaf extract is 1:1~80; mass ratio of the biological composition to the carrier is 0.1%~5.0%; the addition of the carrier with biological composition in the tow filter rod is 3-30mg/cigarette.

8. A method of preparing the composite filter tip according to Claim 7, which is **characterized in that** mass ratio of cobalt porphyrin to ginkgo leaf extract is 1:1~10.

9. A composite filter tip containing biological composition according to Claims 1-8 is applied to a cigarette.

Patentansprüche

1. Eine Art von Verbundstruktur-Zigarettenfilter umfassend eine biologische Zusammensetzung, die **dadurch gekennzeichnet ist, dass** die biologische Zusammensetzung an einem Träger anhaftet, der zum Verbindungsfilterstab hinzugefügt wird, wenn der Stab hergestellt wird und die biologische Zusammensetzung aus Kobalt-Porphyrin und Ginkoblattextrakt besteht.

2. Eine Art von Verbundstruktur-Zigarettenfilter umfassend eine biologische Zusammensetzung gemäß dem Anspruch 1, die **dadurch gekennzeichnet ist, dass** es der Doppelverbundstrukturfilter ist, der vom Verbindungsfilterstab mit biologischer Zusammensetzung und dem Verbindungsfilterstab ohne biologische Zusammensetzung hergestellt wird.

3. Eine Art von Verbundstruktur-Zigarettenfilter umfassend eine biologische Zusammensetzung gemäß dem Anspruch 1, die **dadurch gekennzeichnet ist, dass** das Masseverhältnis vom Kobalt-Porphyrin zu Ginkoblattextrakt 1:1~80 beträgt; das Verhältnis der Masse der biologischen Zusammensetzung zum Träger 0.1 %~5.0%. beträgt; das Hinzufügen des Trägers mit biologischer Zusammensetzung in dem Verbindungsfilterstab 3-30 mg pro Zigarette beträgt.

4. Eine Art von Verbundstruktur-Zigarettenfilter umfassend eine biologische Zusammensetzung gemäß dem Anspruch 3, die **dadurch gekennzeichnet ist, dass** das Masseverhältnis von Kobalt-Porphyrin zu Ginkoblattextrakt 1:1~50 beträgt.

5. Eine Art von Verbundstruktur-Zigarettenfilter umfassend eine biologische Zusammensetzung gemäß dem Anspruch 4, die **dadurch gekennzeichnet ist, dass** das Masseverhältnis von Kobalt-Porphyrin zu Ginkoblattextrakt 1:1~10 beträgt.

6. Verfahren zur Herstellung des Verbundstruktur-Zigarettenfilters umfassend eine biologische Zusammensetzung, aufweisend die folgenden Schritte:

(1) Die biologische Zusammensetzung von Kobalt-Porphyrin und Ginkoblattextrakt wird vorbereitet und in Ethanol gelöst. Zusätzlich wird Polyvinylpyrrolidone zu der EthanolLösung umfassend eine biologische Zusammensetzung hinzugefügt und durchmischt.

(2) Die Mischung in Schritt (1) haftet an den Träger an.

(3) Der Träger in Schritt (2) wird gleichmäßig hinzugefügt, wenn der Verbindungsfilterstab hergestellt wird.

(4) Der Verbindungsfilterstab mit der Zusammensetzung und einer ohne der Zusammensetzung wird anschließend jeweils mit dem inneren Drehpapier aufgerollt.

(5) Schließlich werden Verbindungsfilterstäbe zu dem Zigarettenfilter gemacht, mit einem äußeren Drehpapier auf dem Verbundzigarettenfiltererzeuger.

7. Verfahren zur Herstellung eines Verbundstruktur-Zigarettenfilters gemäß dem Anspruch 6, das **dadurch gekennzeichnet ist, dass** die biologische Zusammensetzung aus Kobalt-Porphyrin und Ginkoblattextrakt besteht; das Masseverhältnis von Kobalt-Porphyrin zu Ginkoblattextrakt 1:1 -80 beträgt; das Masseverhältnis der biologischen Zusammensetzung zu dem Träger 0.1‰~5.0‰ beträgt; das Hinzufügen des Trägers mit biologischer Zusammensetzung in dem Verbindungsfilterstab 3-30 mg pro Zigarette beträgt.
8. Verfahren zur Herstellung eines Verbundstruktur-Zigarettenfilters gemäß dem Anspruch 7, das **dadurch gekennzeichnet ist, dass** das Masseverhältnis von Kobalt-Porphyrin zu Ginkoblattextrakt 1:1~10 beträgt.
9. Verbundstruktur-Zigarettenfilter umfassend eine biologische Zusammensetzung gemäß den Ansprüchen 1 - 8, der für eine Zigarette verwendet wird.

Revendications

1. Type d'embout de filtre composite contenant une composition biologique qui est **caractérisé en ce que** la composition biologique adhère à un support qui est ajouté à la tige de filtre à mèche lorsque la tige est fabriquée et la composition biologique consiste en porphyrine de cobalt et extrait de feuille de ginkgo.
2. Type d'embout de filtre composite contenant une composition biologique selon la revendication 1 qui est **caractérisé en ce que** c'est un filtre composite jumelé qui est fait en tige de filtre à mèche avec la composition biologique et en tige de filtre à mèche sans la composition biologique.
3. Type d'embout de filtre composite contenant une composition biologique selon la revendication 1 qui est **caractérisé en ce que** le rapport de masse de porphyrine de cobalt et d'extrait de feuille de ginkgo est de 1:1~80, le rapport de masse de la composition biologique et du support est de 0,1‰~ 5,0‰, l'addition du support avec la composition biologique dans la tige de filtre à mèche étant de 3 à 40 mg/cigarette.
4. Type d'embout de filtre composite contenant une composition biologique selon la revendication 1 qui est **caractérisé en ce que** le rapport de masse de porphyrine de cobalt et d'extrait de feuille de ginkgo est de 1:1~50.
5. Type d'embout de filtre composite contenant une composition biologique selon la revendication 1 qui est **caractérisé en ce que** le rapport de masse de porphyrine de cobalt et d'extrait de feuille de ginkgo est de 1:1~10.
6. Procédé de préparation de l'embout de filtre composite contenant la composition biologique comprenant les étapes suivantes :
 - (1) la composition biologique de porphyrine de cobalt et d'extrait de feuille de ginkgo est préparée et dissoute dans de l'éthanol. De plus, un polyvinylpyrrolidone est ajouté à la solution d'éthanol contenant la composition biologique et y est mélangé.
 - (2) Le mélange de l'étape (1) adhère au support.
 - (3) Le support de l'étape (2) est ajouté uniformément lorsque la tige de filtre à mèche est fabriquée.
 - (4) Ensuite, la tige de filtre à mèche avec la composition et une tige de filtre à mèche sans la composition sont enroulées respectivement avec le papier du serpent intérieur.
 - (5) Finalement, les tiges de filtres sont entrées dans l'embout de filtre sans papier de serpent extérieur sur l'appareil de fabrication d'embout de filtre.
7. Procédé de préparation de l'embout de filtre composite selon la revendication 6 qui est **caractérisé en ce que** la composition biologique consiste en porphyrine de cobalt et extrait de feuille de ginkgo, le rapport de masse de la composition biologique et du support est de 0,1‰~ 5,0‰, l'addition du support avec la composition biologique dans la tige de filtre à mèche étant de 3 à 40 mg/cigarette.
8. Procédé de préparation de l'embout de filtre composite selon la revendication 6 qui est **caractérisé en ce que** le rapport de masse de porphyrine de cobalt et d'extrait de feuille de ginkgo est de 1:1~10.
9. Embout de filtre composite contenant une composition biologique selon les revendications 1 à 8 appliqué dans une cigarette.

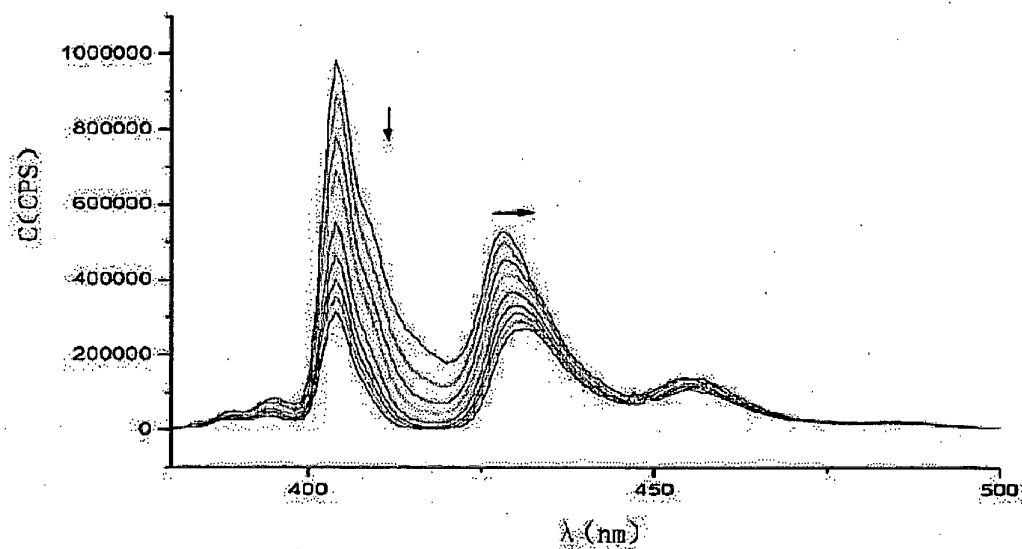


Figure 1

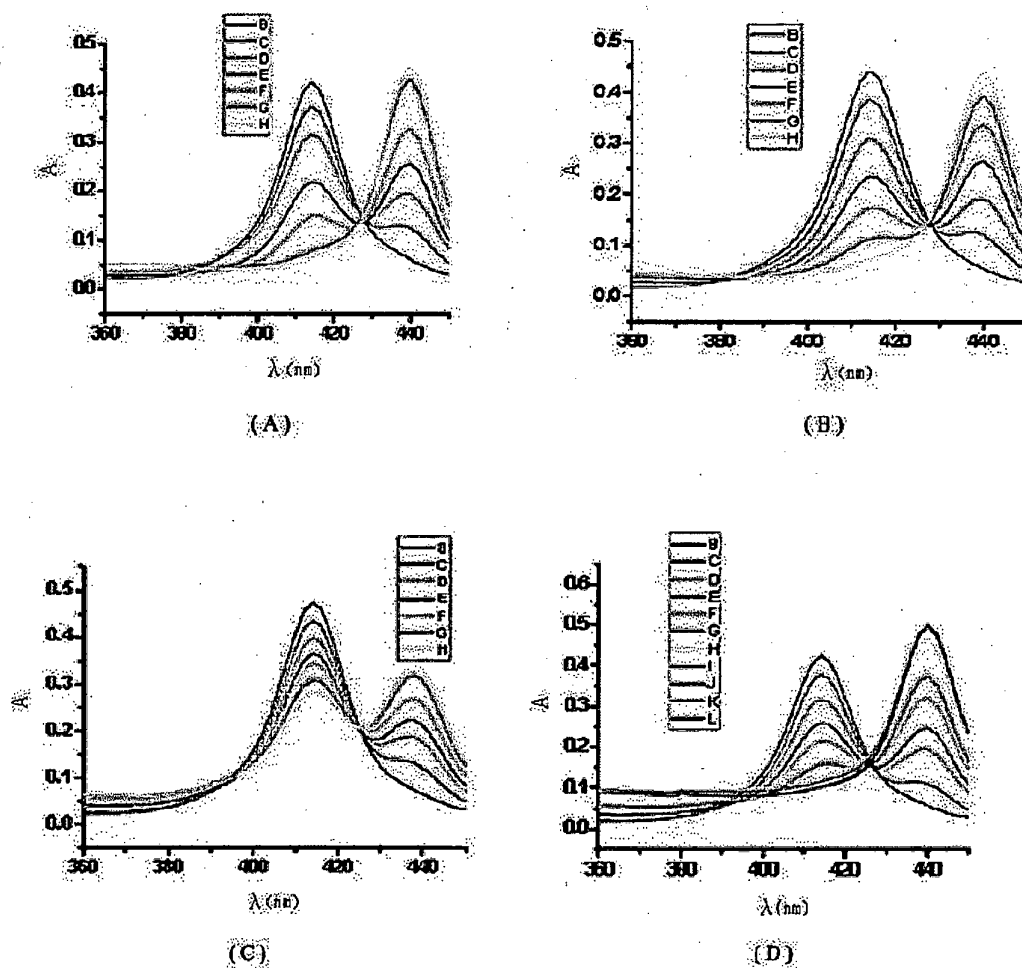


Figure 2

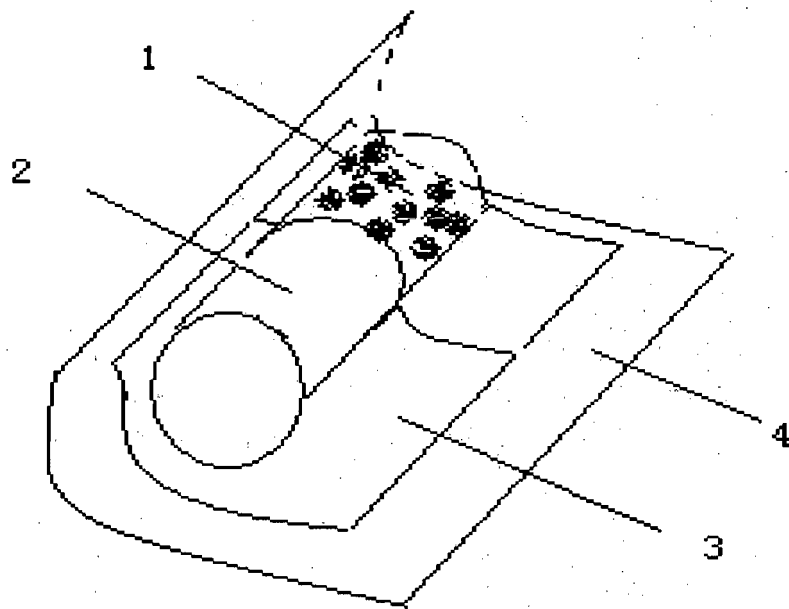


Figure 3

REFERENCES CITED IN THE DESCRIPTION

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