

DESCRIPTION

Title of Invention Sheet for mask

5 Technical Field

[0001]

The present invention relates to a sheet for mask, for preventing adhesion of pollens floating in the air to a mask and a mask using the sheet.

10 Background Art

[0002]

Many people have suffered from pollinosis in recent years, which has become a serious social problem. Pollinosis is an allergic disease which occurs when pollens enter the body and cause various symptoms such as sneeze, snivel, headache, lacrimation,

15 blurred vision, and general malaise.

[0003]

Although a variety of pharmaceuticals and treatment methods have been studied with a view to treating pollinosis, there is nothing superior to prevention of pollens from entering the body. A number of masks which block passage of pollens or masks which

20 trap and adsorb pollens thereto have been developed in order to prevent invasion of pollens in the body (Patent Documents 1 to 3).

[0004]

For example, even if invasion of pollens in the body can be prevented by wearing such a mask outside, however, pollens which have adhered to the mask are

25 brought into a room and float in the room. As a result, the pollens often enter the body and cause or worsen pollinosis.

Prior Art Documents

Patent Documents

30 [0005]

Patent Document 1: Japanese Patent Application Laid-Open No. 2005-95370

Patent Document 2: Japanese Patent Application Laid-Open No. 2007-21025

Patent Document 3: Japanese Patent Application Laid-Open No. Hei.-10-225526

Disclosure of the Invention

Problem to be Solved by the Invention

[0006]

5 Masks proposed so far cannot sufficiently prevent pollens from adhering thereto and there is a demand for the development of masks having pollen adhesion preventing ability. An object of the present invention is therefore to provide a sheet for mask excellent in pollen adhesion preventing ability.

10 Means for Solving the Problem

[0007]

 With the above-mentioned problem in view, the present inventors have conducted various extensive investigations. As a result, it has been found that a sheet for mask made of a base material coated with a coating agent containing a silicon-based
15 compound and a cationic antistatic agent reduces an adhesion space of pollens and at the same time, suppresses electrostatic charging and therefore, does not attract pollens, leading to the completion of the invention.

[0008]

The present invention is as described below.

- 20 1. A sheet for mask, comprising a base material coated with a coating agent containing a silicon-based compound and a cationic antistatic agent.
2. The sheet for mask as described in 1 above, wherein the base material is a nonwoven fabric.
3. The sheet for mask as described in 1 or 2 above, wherein the silicon-based
25 compound is at least one of polymethylchlorosiloxane and silicon dioxide.
4. The sheet for mask as described in any one of 1 to 3 above, wherein the cationic antistatic agent is octadecylamine acetate.
5. The sheet for mask as described in any one of 2 to 4 above, wherein the nonwoven fabric has a weight of 40 g/m² or less.
- 30 6. A pollen adhesion preventing mask comprising a main body covering a face portion to be covered therewith including a nose and a mouth and an ear hanging part provided at left and right sides of the main body for hanging over the ear, wherein the

outermost layer of the main body comprises the sheet for mask as described in any one of 1 to 5 above.

7. The pollen adhesion preventing mask as described in 6 above, wherein the main body has a layered structure of three or more layers and one of intermediate layers
5 stacked between the outermost layer and the innermost layer comprises an ultrafine fiber filter.

Effect of the Invention

[0009]

10 Since the sheet for mask according to the invention has a base material coated with a coating agent containing a silicon-based compound, it can effectively reduce an adhesion space of allergen-containing pollens. At the same time, since the base material is coated with a coating agent containing a cationic antistatic agent, it produces an effect of preventing the mask from being easily charged electrostatically and preventing the mask
15 from attracting negatively-charged pollens.

Brief Description of the Drawings

[0010]

[FIG. 1] Figs. 1(a) and 1(b) are cross-sectional views showing one example of the mask
20 of the present invention.

[FIG. 2] Fig. 2 is a schematic view showing one example of the mask of the present invention.

[FIG. 3] Fig. 3 is a schematic view showing one example of the mask of the present invention.

25

Best Mode for Carrying out the Invention

[0011]

30 The sheet for mask according to the present invention comprises a base material coated with a coating agent containing a silicon-based compound and a cationic antistatic agent. As the base material of the sheet for mask according to the present invention, materials generally known as materials for mask can be used. Specific examples include nonwoven fabrics made of, for example, polyester fibers, polypropylene fibers, rayon

fibers, nylon fibers, acetate fibers, wool fibers, cotton fibers, urethane fibers, and polyethylene fibers, gauze, paper, and moisture permeable resin sheets.

[0012]

Of the above-mentioned materials, for example, nonwoven fabrics made of polyester, nylon, rayon, or cotton fibers are suited for coating with a coating agent containing a silicon-based compound and a cationic antistatic agent (which may also be called "coating agent", hereinafter).

[0013]

Of these, nonwoven fabrics made of polyester or nylon fibers is preferably used from the standpoint of processability. When the nonwoven fabric is used as the base material, the weight of the nonwoven fabric is preferably 40 g/m² or less, more preferably 35 g/m² or less. In addition, it is preferably 10 g/m² or greater, more preferably 20 g/m² or greater. The nonwoven fabric having a weight of 40 g/m² or less can produce an excellent pollen adhesion preventing effect.

[0014]

Examples of such nonwoven fabric include 6035A (product of Mie Tech, material: polyester, weight: 35 g/m²), 6040A (product of Mie Tech, material: polyester, weight: 40 g/m²), AC5020 (product of Asahi Kasei Fibers corporation, material: polyester, weight: 20 g/m²), AC5040 (product of Asahi Kasei Fibers corporation, material: polyester, weight: 40 g/m²), N01020 (product of Asahi Kasei Fibers corporation, material: nylon, weight: 20 g/m²), N01030 (product of Asahi Kasei Fibers corporation, material: nylon, weight: 30 g/m²), N01040 (product of Asahi Kasei Fibers corporation, material: nylon, weight: 40 g/m²), N03020 (product of Asahi Kasei Fibers corporation, material: nylon, weight: 20 g/m²), N03040 (product of Asahi Kasei Fibers corporation, material: nylon, weight: 40 g/m²), N05020 (product of Asahi Kasei Fibers corporation, material: nylon, weight: 20 g/m²), N05030 (product of Asahi Kasei Fibers corporation, material: nylon, weight: 30 g/m²), and N05040 (product of Asahi Kasei Fibers corporation, material: nylon, weight: 40 g/m²).

[0015]

Examples of the silicon-based compounds contained in the coating agent to be used in the present invention include straight silicones such as polymethylchlorosiloxane, silicon dioxide, and dimethyl silicone and modified silicone oils such as alkyl-modified

ones. Of these, polymethylchlorosiloxane and silicon dioxide are preferred from the standpoint of a pollen adhesion preventing effect.

[0016]

As the cationic antistatic agent contained in the coating agent to be used in the present invention, cationic surfactants are preferred. Examples of the cationic surfactants include octadecylamine acetate, octadecyldimethylbenzylammonium chloride, alkyltrimethylammonium chloride, tetradecyldimethylbenzylammonium chloride, dioleyldimethylammonium chloride, octadecyltrimethylammonium chloride, alkyltrimethylammonium chloride, dodecyltrimethylammonium chloride, hexadecyltrimethylammonium chloride, tetradecylamine acetate, perfluoroalkyltrimethylammonium salt, and perfluoroalkyl quaternary ammonium salt. Of these, octadecylamine acetate, tetradecylamine acetate, and octadecyltrimethylammonium chloride are preferred from the standpoint of a pollen adhesion preventing effect, with octadecylamine acetate being more preferred.

[0017]

In the coating agent to be used in the present invention, a mass ratio of the silicon-based compound and the cationic antistatic agent is adjusted to preferably from 10:1 to 1:10, more preferably from 5:2 to 2:5. A sufficient pollen adhesion preventing effect can be achieved by adjusting the mass ratio to fall within the above-described range.

[0018]

The coating agent to be used in the present invention may contain a fluorine-based processing agent containing a fluorine-based resin, a paraffin-based processing agent, and a wax-based processing agent. Examples of the fluorine-based processing agent include a fluorinated resin emulsion and an aqueous fluorinated resin solution. Examples of the paraffin-based processing agent include a high-melting-point paraffin emulsion and a low-melting-point paraffin emulsion. Examples of the wax-based processing agent include an oxidized wax emulsion and a microwax emulsion.

[0019]

As a method of coating the base material with the coating agent, conventionally known methods can be used. For example, the coating agent can be attached/applied to the base material by a proper method such as application or impregnation using a spray, a roll, a brush, or the like. From the standpoint of production efficiency, impregnation is preferred.

[0020]

The method using impregnation will next be described specifically. For example, a coating solution or suspension is prepared by dissolving or suspending the silicon-based compound and the cationic antistatic agent in water, ethyl alcohol, or isopropyl alcohol in a conventional manner. After the base material is impregnated with the coating solution at normal temperature for from several seconds to tens of seconds, the resulting base material is dried for several seconds or several minutes at a temperature of preferably from 120°C to 170°C, more preferably from 140°C to 150°C. The impregnation time and drying temperature and time can be set as needed by those skilled in the art, depending on the concentration of the coating solution or the size of the base material.

[0021]

In the sheet for mask according to the present invention, the amount of the coating agent used for coating the base material is preferably from 0.2 to 2.5 g/m², more preferably from 0.3 to 1.0 g/m² relative to the base material from the standpoint of the cost and pollen adhesion preventing effect.

[0022]

The thickness of the base material formed with the coating agent is adjusted to preferably from 60 to 200 μm, more preferably from 90 to 150 μm from the standpoint of the cost and pollen adhesion preventing effect.

[0023]

The sheet for mask according to the present invention can be used for a pollen adhesion preventing mask. The mask of the present invention is equipped with a main body covering a face portion to be covered therewith including a nose and a mouth and an ear hanging part provided at left and right sides of the main body for hanging it over the ear.

[0024]

When the sheet for mask according to the present invention is used for a pollen adhesion preventing mask, the main body 10 has preferably a multilayer structure, as shown in Figs. 1(a) and (b), available by stacking the sheet for mask according to the present invention and at least one of the base materials such as gauze and nonwoven fabric. The main body 10 has a multilayer structure so that the main body 10 can have improved durability. Figs. 1(a) and (b) show a mask made of a sheet material 11 comprised of four

layers in total, that is, an outermost layer 11A, intermediate layers 11B (two layers), and an innermost layer 11C. The mask of the invention is not limited to it and may have a multilayer structure other than the four-layer structure or may be a single layer structure.
[0025]

5 Described specifically, with regards to the stacking order of these layers, it is preferred to use the sheet for mask according to the present invention as the outermost layer 11A when people wear a mask. The base material to be used as the innermost layer 11C is preferably a nonwoven fabric which is less fluffy and is comfortable to touch. The intermediate layer 11B may be stacked between the sheet for mask according to the present
10 invention which is the outermost layer 11A and the base material which is the innermost layer 11C. The intermediate layer 11B may be a single layer or two or more layers. It is preferred to use an ultrafine fiber filter as at least one of the intermediate layers 11B.

[0026]

The term “ultrafine fiber filter” as used herein means a nonwoven fabric (melt
15 blown nonwoven fabric) manufactured through a melt blown process by using, as the raw material thereof, polyester fibers, polypropylene fibers, or polyethylene fibers. By forming the intermediate layer of the main body 10 from this ultrafine fiber filter, even if pollens pass through the sheet for mask according to the present invention used as the outermost layer 11A, invasion of pollens can be prevented at the ultrafine fiber filter. Moreover,
20 using an antibacterial sheet as one of the intermediate layers 11B enables prevention of the invasion of viruses or the like.

[0027]

The sheet for mask according to the present invention can be used for, as well as a planar mask, a mask whose main body can be transformed into a steric shape so as to
25 be fitted to the shape of the face. Examples of such a mask include a pleated mask (refer to Fig. 2) obtained by pleating the main body made of a nonwoven fabric or the like in a transverse direction and a three-dimensional mask (refer to Fig. 3) obtained by joining two sheet members as a jointed palm form at the center of the main body.

[0028]

30 The pleated mask 12 shown in Fig. 2 has pleats 14 formed from a plurality of fold lines 13 (four folds in Fig. 2) running in a transverse direction. The pleats 14 are folded as two almost Ω -shapes in the state shown in Fig. 2 and the pleats 14 are constituted so as to form a three-dimensional shape to be expanded outward. As materials of the ear

hanging part 15, preferred examples include polyester fibers, rayon fibers, nylon fibers, gauze, paper and moisture-permeable resin sheets.

[0029]

5 The main body 10 may be equipped with a nose fitter 16 near the upper side portion of the main body. As the nose fitter 16, for example, an elongated plate made of a metal, polyethylene, or the like can be used.

[0030]

10 A three-dimensional mask 30 shown in Fig. 3 is equipped with a main body 31 formed by bonding a pair of fan-shape sheet materials 34A and 34B at a bonding part 33 and ear hanging parts 32. The bonding part 33 is formed as a curve that protrudes outward and the mask is constituted so as to form a three-dimensional shape that expands outward by opening the sheet materials 34A and 34B to right and left.

[0031]

15 Moreover, a mask obtained by coating the outside of a conventional mask with the coating agent of the present invention without using the sheet for mask according to the present invention is also embraced within the scope of the present invention.

EXAMPLES

[0032]

20 (1) Preparation of a sheet for mask

Sheets for mask were prepared, respectively, by coating Base material 1 (6035A, product of Mie Tech), Base material 2 (6040A, product of Mie Tech), Base material 3 (AC5020, product of Asahi Kasei Fibers corporation), and Base material 4 (N05020, product of Asahi Kasei Fibers corporation) with a coating agent containing a
25 silicon-based compound and a cationic antistatic agent.

[0033]

30 The coating treatment of each of Base materials was conducted by impregnating it, at normal temperature for from 2 to 3 seconds, with a coating solution prepared by mixing 1% by mass polymethylchlorosiloxane, 0.1% by mass silicon dioxide, and 0.5% by mass octadecylamine acetate with water, and drying the resulting base material at 150°C for 30 seconds.

[0034]

(2) Production of a mask

Pleated masks 1 to 4 were produced in a usual manner by using the mask sheets prepared above in (1) as an outermost layer and stacking thereover a polypropylene nonwoven fabric as an innermost layer and an ultrafine fiber filter (a melt-blow nonwoven fabric made of polypropylene) as an intermediate layer.

[0035]

(3) Confirmatory test of pollen adhesion preventing performance

Masks 1 to 4 produced above in (2) and a commercially available mask ("Clean Line Kowa Three-dimensional Mask", product of Kowa Company) were put in a 4.5-L plastic bag containing 1.0 g of pseudo pollens (*Lycopodium: Lycopodium clavatum* spore) with a mountain fold on the outermost layer side and the bag was shaken 100 times (once/second). Then, the resulting masks were each taken out from the plastic bag. After shaking the mask lightly several times, the number of pseudo pollens which had adhered to the outermost layer of the mask was measured with naked eyes under a stereomicroscope ("M3Z", product of Leica Microsystems). An area to be measured was 5 mm × 5 mm. The adhesion number of pollens to the mask was measured at 5 positions per mask and the sum of them was compared among the masks. A pollen adhesion preventing percentage was found from the following equation. The results are shown in Table 1.

[0036]

[Equation 1]

Pollen adhesion preventing percentage (%) =

(the adhesion number of pollens to the commercially available mask) – (the adhesion number of pollens to each of Masks 1 to 4) / (the adhesion number of pollens to the commercially available mask) × 100

[0037]

[Table 1]

Test material	Base material	Weight of base material (g/m ²)	Coating	Adhesion number of pollens (piece)	Pollen adhesion preventing percentage (%)
Mask 1	Base material 1	35	Coated	500	91.7
Mask 2	Base material 2	40	Coated	3000	50.0
Mask 3	Base material 3	20	Coated	220	96.3
Mask 4	Base material 4	20	Coated	290	95.2
Commercially available mask	-	-	Not coated	6000	0

[0038]

5 As shown in Table 1, it has been found that Masks 1 to 4 produced using the sheet coated with a coating agent containing a silicon-based compound and a cationic antistatic agent have excellent pollen adhesion preventing performance because the adhesion number of pollens is markedly smaller than that of the commercially available mask.

10 [0039]

Masks 1, 3, and 4 produced respectively by using the sheets for mask obtained by coating Base materials 1, 3, and 4 having a weight not greater than 35 g/m² with a coating agent showed a higher pollen adhesion preventing percentage than Mask 2 produced using the sheet for mask obtained by coating Base material 2 having a weight of 40 g/m² with a coating agent. These results have revealed that a mask having a higher pollen adhesion preventing percentage can be obtained by adjusting the weight of the base material to be used for the sheet for mask to 35 g/m² or less.

Explanation of Symbols

20 [0040]

12, 30: Mask

10, 31: Main body

15, 32: Ear hanging part

CLAIMS

[Claim 1]

5 A sheet for mask, comprising a base material coated with a coating agent containing a silicon-based compound and a cationic antistatic agent.

[Claim 2]

10 The sheet for mask according to Claim 1, wherein the base material is a nonwoven fabric.

[Claim 3]

The sheet for mask according to Claim 1 or 2, wherein the silicon-based compound is at least one of polymethylchlorosiloxane and silicon dioxide.

15 [Claim 4]

The sheet for mask according to any one of Claims 1 to 3, wherein the cationic antistatic agent is octadecylamine acetate.

[Claim 5]

20 The sheet for mask according to any one of Claims 2 to 4, wherein the nonwoven fabric has a weight of 40 g/m² or less.

[Claim 6]

25 A pollen adhesion preventing mask comprising a main body covering a face portion to be covered therewith including a nose and a mouth and an ear hanging part provided at left and right sides of the main body for hanging over the ear, wherein the outermost layer of the main body comprises the sheet for mask as claimed in any one of Claims 1 to 5.

30 [Claim 7]

The pollen adhesion preventing mask according to Claim 6, wherein the main body has a layered structure of three or more layers and one of intermediate layers stacked between the outermost layer and the innermost layer comprises an ultrafine fiber filter.