

~~FILTERING MATERIAL FOR FILTER, AND WATER FILTERING~~
~~APPARATUS PROVIDED WITH FILTERING MATERIAL~~
FILTERING MEDIUM FOR FILTER, AND WATER FILTERING
APPARATUS PROVIDED WITH FILTERING MEDIUM

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CROSS REFERENCE TO THE RELATED APPLICATION

This application is based on and claims convention priority to Japanese patent application No. 2011-076026, filed March 30, 2011, the entire disclosure of which is herein incorporated by reference as a part of this
10 application.

BACKGROUND OF THE INVENTION

(Field of the Invention)

The present invention relates to a filtering material for filtering water in which an ethylene-vinyl alcohol copolymer nanofiber layer and a base material
15 comprising a nonwoven or woven fabric formed from hydrophilic fibers are laminated on each other, and a water filtering apparatus provided with the filtering material.

(Description of Related Art)

As a filtering material for removing fine particles contained in water,
20 a filtering material has been proposed in which an ultrafine fiber aggregate layer and a fine fiber aggregate layer are laminated on each other (Patent Document 1). The ultrafine fiber aggregate layer is formed from nanofibers produced by electro-spinning and having a single fiber average diameter of not less than 10 nm and less than 500 nm. The fine fiber aggregate layer has an average fiber
25 diameter of not less than 0.5 μm and not greater than 5 μm .

In addition, a filtering material for filter has been proposed which comprises a sheet in which a layer formed from nanofibers produced by electro-spinning and having a single fiber average diameter of 10 to 1000 nm is laminated with a base material comprising a nonwoven or woven fabric formed
30 from fibers having a single fiber average diameter of greater than 5 μm (Patent Document 2).

What is claimed is:

1. A filtering material for filtering water comprising a laminated sheet which comprises:

a nanofiber layer formed from a nanofiber having a single fiber average diameter of 10 to 1000 nm, the nanofiber layer meeting all the following conditions (1) to (3):

- (1) the nanofiber layer has a basis weight of 0.1 to 10 g/m²,
- (2) the nanofiber is a continuous long fiber, and
- (3) the nanofiber comprises at least an ethylene-vinyl alcohol copolymer; and

a base material comprising a nonwoven or woven fabric comprising a hydrophilic fiber having a single fiber average diameter of not less than 1 μm, the nanofiber layer and the base material being laminated on each other.

2. The filtering material for filtering water as claimed in claim 1, wherein the ethylene-vinyl alcohol copolymer has an ethylene content of 3 to 70 mol%.

3. The filtering material for filtering water as claimed in claim 1 or 2, wherein the nanofiber layer is an electro-spun fiber aggregate layer.

4. The filtering material for filtering water as claimed in claim 3, wherein the hydrophilic fiber constituting the nonwoven fabric comprises a polyvinyl alcohol polymer.

5. The filtering material for filtering water as claimed in claim 1, wherein the base material has a basis weight of 20 to 500 g/m².

6. The filtering material for filtering water as claimed in claim 5, wherein the laminated sheet comprises a base material and an electro-spun fiber aggregate layer on the base material.

7. The filtering material for filtering water as claimed in claim 6, wherein the laminated sheet is subjected to embossing treatment or calendaring treatment after formation of the fiber aggregate layer.

8. A filter cartridge comprising at least partially the filtering material for filtering water as claimed in any one of claims 1 to 7.

9. A water filtering apparatus comprising a filter cartridge including at least partially a laminated sheet which comprises:

a nanofiber layer formed from a nanofiber having a single fiber average diameter of 10 to 1000 nm, the nanofiber layer meeting all the following conditions (1) to (3):

(1) the nanofiber layer has a basis weight of 0.1 to 10 g/m²,

(2) the nanofiber is a continuous long fiber, and

(3) the nanofiber comprises at least an ethylene-vinyl alcohol copolymer; and

a base material comprising a nonwoven or woven fabric containing hydrophilic fibers having a single fiber average diameter of not less than 1 μm.

What is claimed is:

1. A filtering material for filtering water comprising a laminated sheet which comprises:
 - 5 a nanofiber layer formed from a nanofiber having a single fiber average diameter of 10 to 1000 nm, the nanofiber layer meeting all the following conditions (1) to (3):
 - (1) the nanofiber layer has a basis weight of 0.1 to 10 g/m²,
 - (2) the nanofiber is a continuous long fiber, and
 - 10 (3) the nanofiber is a hydrophilic single layer fiber produced from (i) an ethylene-vinyl alcohol copolymer alone having an ethylene content of 3 to 70 mol% and a saponification degree of more than 80 mol% produced by saponifying a copolymer consisting of ethylene-vinyl acetate or from (ii) a composition including at least 10% by mass of the ethylene-vinyl alcohol copolymer; and
 - 15 a base material layer comprising a nonwoven or woven fabric comprising a hydrophilic fiber having a hydrophilic fiber surface and having a single fiber average diameter of not less than 1 μ m, the nanofiber layer and the base material layer being laminated on each other through an interlayer adhesion.
2. The filtering material for filtering water as claimed in claim 1, wherein
20 the nanofiber layer is an electro-spun fiber aggregate layer.
3. The filtering material for filtering water as claimed in claim 1 or 2, wherein the hydrophilic fiber constituting the nonwoven fabric comprises a polyvinyl alcohol polymer.
4. The filtering material for filtering water as claimed in claim 1, wherein
25 the base material later has a basis weight of 20 to 500 g/m².
5. The filtering material for filtering water as claimed in claim 4, wherein the laminated sheet comprises the base material layer and an electro-spun fiber aggregate layer on the base material layer.

6. The filtering material for filtering water as claimed in claim 5, wherein the laminated sheet is subjected to embossing treatment or calendaring treatment after formation of the fiber aggregate layer.
7. A filter cartridge comprising at least partially the filtering material for
5 filtering water as claimed in any one of claims 1 to 6.
8. A water filtering apparatus comprising a filter cartridge including at least partially a laminated sheet which comprises:
- a nanofiber layer formed from a nanofiber having a single fiber average diameter of 10 to 1000 nm, the nanofiber layer meeting all the following conditions
10 (1) to (3):
- (1) the nanofiber layer has a basis weight of 0.1 to 10 g/m²,
- (2) the nanofiber is a continuous long fiber, and
- (3) the nanofiber is a hydrophilic single layer fiber produced from (i) an ethylene-vinyl alcohol copolymer alone having an ethylene content of 3 to 70 mol%
15 and a saponification degree of more than 80 mol% produced by saponifying a copolymer consisting of ethylene-vinyl acetate or from (ii) a composition including at least 10% by mass of the ethylene-vinyl alcohol copolymer; and
- a base material layer comprising a nonwoven or woven fabric containing hydrophilic fibers having a hydrophilic fiber surface and having a single fiber
20 average diameter of not less than 1 μ m, the nanofiber layer and the base material layer being laminated on each other through an interlayer adhesion.