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(71)(72) **Applicant and Inventor:** LEE, Soung, Moo [KR/KR]; 302–501, Dongsin Apt., 117, Emae–dong, Bundang–ku, Sungnam–si, Kyungki–do 463–060 (KR).

(74) **Agent:** HUH, Sang, Hoon; 13th floor, Hyecheon Building, 831, Yeoksam–dong, Kangnam–ku, Seoul 135–792 (KR).

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(54) **Title:** SANITARY FINISHED STUFFED/PLUSH TOY AND ITS MANUFACTURING METHOD

(57) **Abstract**

A sanitary finished stuffed/plush toy and the manufacturing method thereof, which provides sanitary condition for play by the infants and children, wherein the fabric materials are treated and affixed with an antibacterial chemical which is colorless, transparent and unharmful to the human body, and the raw material particles of the plastic projections which are used for an eye, nose, etc. of the stuffed/plush toy are treated with the antibacterial chemical, in order to maintain the semi–permanent antibacterial activity in whole even after washing.

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SANITARY FINISHED STUFFED/PLUSH TOY AND ITS MANUFACTURING METHOD

BACKGROUND OF THE INVENTION

Field of the Invention

This invention relates to a sanitary finished stuffed/plush toy and the manufacturing method thereof, which provides sanitary condition for play by the infants and children. More particularly, the invention relates to the novel sanitary finished stuffed/plush toy and the manufacturing method thereof, wherein the fabric materials are treated and affixed with the antibacterial chemical which is colorless, transparent and unharmful to the human body, and the raw material particles of the plastic projections which are used for an eye, nose, etc of the stuffed/plush toy are treated with said antibacterial chemical, in order to maintain the semi-permanent antibacterial activity in whole even after washing.

Description of the Prior Art

A variety of microorganisms which directly effect human life are largely classified into the pathogenic (e.g., bacteria, fungi and yeast) and non-pathogenic types. In order to eliminate or eradicate the pathogenic microorganisms which are harmful to human, various methods of anti-bacterial chemicals are used. In particular, in parallel with the improvement of one's life in recent years, the better sanitary consciousness and intensive research thereto have been on the rise. Among other things, the antibacterial treatment has drawn a keen attention from the general public in that such treatment may help to prevent many of the contagious diseases induced by inhabitation and multiplication of the microorganisms in the environment.

Meanwhile, a stuffed/plush toy which has been widely used at home

and professional nursery institutes consists of polyester or acrylic fiber and plastic projection ornaments. Such stuffed/plush toy is recognized as one of the favorite toys by children of less than 10 years of age, e.g., the infants ranging from 2 ~ 3 years of age.

Unlike the adults with strong bacteria resistance, the infants with weak bacteria resistance is vulnerable to various pathogenic microorganisms which are present in the environment. The infants and children are in a direct contact with a toy, and the personal hygiene concerns may rise to the level of the life-threatening situation.

As for a stuffed/plush toy, it is commonly accepted that the detection process be undertaken to check the needle or metal in the sewing process based on the ongoing inspection on general safety. Nevertheless, under the situation where infants are apt to suck all things by mouth, the conventional stuffed/plush toy with no antibacterial treatment is vulnerable to infiltration of general microorganisms which are present in the plastic molding ornaments such as eye, nose in addition to the fibers therein. Furthermore, the human saliva smeared onto the stuffed/plush toy may promote the unsanitary conditions for proliferation of microorganisms. In this context, there is an urgent need for improvement in the aforementioned unsanitary conditions.

As such, the conventional stuffed/plush toy has disadvantages in that in spite of the fact that the end-users of a toy is limited to infants and children whose resistance to bacteria is extremely low, the conventional toy is not designed to prevent the growth of microorganisms. On the contrary, the suitable conditions for inhabitation of bacteria are endangering the sanitation of infants, thus necessitating the proper antibacterial treatment. In this context, there is an urgent need for the antibacterial treatment which is unharmful and can sustain antibacterial activity even after washing.

SUMMARY OF THE INVENTION

Therefore, the object of this invention is to provide a sanitary finished stuffed/plush toy and the manufacturing method thereof, wherein each of the antibacterial treatment using unharmful anti-bacterial chemical is applied to the fabric and plastic molding ornament materials. Thereafter, the toy is able to sustain antibacterial activity even after washing, thus optimizing the safety conditions where infants and children can play with the toy under the sanitary environment.

Detailed Description of the Invention

This invention relates to a sanitary finished stuffed/plush toy comprising plastic molding ornaments and fabric materials, wherein said plastic molding undergoes an antibacterial treatment while in the projection-molding state by means of mixing α-phosphate zirconium having ion-exchanged silver ion prior to projection, and said fabric materials are fixated with cationic quaternary ammonium chloride.

Further, this invention includes a process of manufacturing a sanitary finished stuffed/plush toy comprising of plastic molding ornaments and fabric materials, wherein:

the plastic projection molding ornaments are fabricated in such a manner that α-phosphate zirconium having ion-exchanged silver-ion is added to the raw materials prior to projection and mixed at 200 ~ 270℃, the mixture of which undergoes a projection molding;

said antibacterial-treated plastic ornaments and fabric materials are assembled by a common sewing method to manufacture a toy;

a stuffed/plush toy is dipped or padded in cationic quaternary ammonium chloride for the antibacterial treatment, after which is dried; and

the air is fluxed onto a toy at 110 ~ 120℃ in order to ensure the homogenous state with the toy fiber and fixation of the antibacterial chemical onto a toy.

This invention is explained in more detail as set forth hereunder.

This invention relates to a stuffed/plush toy having a semi-permanent antibacterial activity, wherein the molding process of the plastic ornaments is carried, and the toy is thus assembled, after which the toy fiber is treated and fixated with an antibacterial chemical containing appropriate amounts of components.

The plastic molding ornaments of this invention are used for the fabrication of a toy, e.g., for making an eye and nose of a doll. For example, the raw materials of this invention include some generally-used resins such as polystyrene, and ABS. The antibacterial treatment is carried out in such a manner that prior to the projection molding process, the antibacterial chemical is added to the raw materials for mixing therein. The sequential steps of such antibacterial treatment are explained as set forth hereunder.

First, the particles of raw material is placed onto a melting jar and dissolved by heating at 200 ~ 230℃ for 10 ~ 30 minutes. α-phosphate zirconium having ion-exchanged silver-ion ($MZr_2(PO_4)_3 \cdot yH_2O$, where, M is Na, and $0 \leq y \leq 2$), the antibacterial chemical, is added to this solution. The antibacterial chemical was added in the ratio of 0.1 ~ 1 wt % in proportion to the particles of raw materials and mixed homogeneously at the constant temperature of 240 ~ 270℃ for 10 ~ 40 minutes. The antibacterial effects of the antibacterial chemical can be observed via cell membrane destruction associated with the bactericidal action of the antibacterial metal ions and active oxygen. If the amount of the antibacterial chemical is extremely small, the bactericidal effect is negligible, but the excessive amount thereof affects the chemical composition of the resin, thus inducing much difficulty in the molding process

of a toy.

Then, for fixating the antibacterial chemical, so added, to the raw materials, the reacting solution was again mixed at 210 ~ 230℃ for 5 ~ 20 minutes and welled up to fabricate the molded doll shape such as eye, nose, etc. using a projector. The molding doll shape was cooled, followed by the molding process to manufacture the plastic molding ornaments under such antibacterial treatment.

With the plastic molding product, so treated with the antibacterial chemical, the stuffed/plush toy derived from fabric materials is manufactured by a commonly available process. Then, the antibacterial treatment is directly applied to the toy. The antibacterial treatment for a toy fiber is performed as follows:

According to this invention, the antibacterial chemicals designed for the antibacterial treatment of a toy fiber include colorless, transparent water-soluble cationic quaternary ammonium chloride so as not to affect the color of a toy, and such cationic quaternary ammonium chloride of 1.5% (pH 6 ~ 7) is employed in the ratio of 3 ~ 7 wt % in proportion to the weight of a toy. If the amount of the antibacterial chemical is extremely small, the antibacterial effect is low and incessant, but the excessive amount thereof will affect the appearance of the fabric materials.

The cationic quaternary ammonium chloride used for this invention may be selected from the group consisting of the formaldehyde group, chloride, phenol, alcohol, iodine, epoxide, and compounds containing silver ion.

The formulation of the antibacterial-treatment solution derived from the antibacterial chemical is made available in such a manner that the volumetric ratio of water to a toy in the antibacterial-treatment solution is 30 : 1, and such solution may be applied to the toy by means of the methods of dipping, padding or spraying.

According to this invention, the antibacterial chemical may be applied to a toy in an appropriate method depending on the materials' characteristics, shape and pile length. For example, the dipping method is suitable for a hairless stuffed/plush toy with light weight such as Nylex. The padding method is appropriate for a doll with adequate thickness and length. The spraying method is suitable for a Hipile toy with long hair and heavy weight. The dipping method is performed in such a manner that the basic cloth of a toy is coiled to a round beam and dipped at 30 ~ 50℃ for 3 ~ 10 minutes into the dipping bath of the antibacterial-treatment solution. The padding method is performed in such a manner that the basic cloth of a toy is coiled to a round beam, and the antibacterial-treatment solution is applied via the surface of beam to a toy at room temperature of 1 ~ 5 minutes. The spraying method is performed in such a manner that the basic cloth of toy is placed on a plain floor, and the antibacterial-treatment solution is directly sprayed onto a toy. According to this invention, the reason for raising the temperature of the dipping bath for the dipping method is that the antibacterial metal ions shows activation at such temperature.

For the purpose of adherence of the antibacterial chemical after completion of the antibacterial-treatment, the air is fluxed onto the dried toy at 100 ~ 120℃ for 1 ~ 5 minutes in order to ensure a homogeneous fabric toy. Hence, since the air flow at a high temperature may enhance the penetration power of textile via capillary phenomenon, the antibacterial activity is sustained even after washing of a toy.

The following examples illustrate various aspects of this invention but are not to be construed to limit the claims in any manner whatsoever.

Example 1

The particles of ABS raw material were placed into to a melting jar and

dissolved by heating at 220℃ for 25 minutes. α-phosphate zirconium($MZr_2(PO_4)_3 \cdot yH_2O$, where M is Na, and $0 \leq y \leq 2$) having ion-exchanged silver-ion, the antibacterial chemical, was added to this solution. The antibacterial chemical was added in the ratio of 0.5 wt % in proportion to the particles of ABS raw material and mixed homogeneously at the constant temperature of 250℃ for 25 minutes.

Then, for fixating the antibacterial chemical, so added, to the raw materials, the reacting solution was again mixed at 220℃ for 10 minutes and welled up to fabricate a molding doll shape such as eye, nose, etc. using a projector. The molded doll shape was cooled, followed by the molding process to manufacture the plastic molding product with such antibacterial treatment.

With the plastic molding product, so treated with the antibacterial chemical, the tiger stuffed/plush toy derived from the acrylic-based fabric materials (size: 30cm, weight: 300g, volume: 1,800㎤, and color: brown) was manufactured by a commonly available process. Then, the antibacterial treatment was directly applied to the toy as follows:

The antibacterial chemical used for the antibacterial treatment of a toy fiber included 15g of the 1.5% solution containing colorless, transparent cationic quaternary ammonium chloride (pH 6.5).

The toy was dipped in the water-mixed chemical solution for antibacterial treatment with the volumetric ratio of water to toy of 30 : 1.

The dipping process was carried out in such a manner that the basic cloth of a toy was coiled to a round beam and dipped at 40℃ for 5 minutes at the dipping bath designed for the antibacterial treatment. The air was fluxed onto the toy, so dried after the antibacterial treatment at 110℃ for 3 minutes, and under the homogeneous state of the fabric toy, the antibacterial treatment for toy was completed.

Example 2

In the same procedure as described in the example 1, a bear doll (size: 50cm, weight: 450g, volume: 4500㎤, and color: black) was manufactured and then was placed under the antibacterial treatment in the same manner.

Example 3

In the same procedure as described in the example 1, a dog doll (size: 12.5cm, weight: 150g, volume: 850㎤, and color: chestnut + black) was manufactured and then was placed under the antibacterial treatment in the same manner.

Example 4

In the same procedure as described in the example 1, a turtle doll (size: 37.5cm, weight: 300g, volume: 3000㎤, and color: green) was manufactured and then was placed under the antibacterial treatment in the same manner.

Example 5

In the same procedure as described in the example 1, a rabbit doll (size: 25cm, weight: 200g, volume: 2200㎤, and color: white + black) was manufactured and then was placed under the antibacterial treatment in the same manner.

Example 6

In the same procedure as described in the example 1, a lion doll (size: 30cm, weight: 320g, volume: 2000㎤, and color: brown) was manufactured and then was placed under antibacterial treatment in the same manner.

Example 7

In the same procedure as described in the example 1, a nymph doll (size: 12.5cm, weight: 115g, volume: 350㎤, and color: pink + violet) was manufactured and then was placed under antibacterial treatment in the same manner.

Experimental example 1

To measure the antibacterial activity, the following antibacterial test was performed, and the results thereof are shown in the following tables 1 and 2:

Test on plastic molding product:

- Test method: SHAKE FLASK METHOD
- Cultivation time: 24 hours
- Cultivation temperature: 30℃
- Contact time: 1 hour
- Standard testing bacteria: Escherichia coli ATCC 25922
- Treatment of test specimen: treated in boiling water for 30 minutes for testing.

Table 1.

Test specimen	Initial number of bacteria	Number of bacteria after 24 hours	Bacetericidal rate
Comp. Fabrics	1.62 × 10	6.70 × 10	
Example 1	1.62 × 10	5.50 × 10	99.2%
Example 2	1.62 × 10	1.60 × 10	97.6%

Test on stuffed/plush toy:

- Test method: SHAKE FLASK METHOD
- Cultivation time: 24 hours

- Cultivation temperature: 30℃

- Contact time: 1 hour

- Standard testing bacteria: Staphylococcus aureus KCTC 1927

Table 2.

Test specimen	Initial number of bacteria	Number of bacteria after 24 hours	Bacetericidal rate
Comp. Fabrics	7.10 × 10	6.60 × 10	
Example 1	7.10 × 10	< 10	100.0%
Example 2	7.10 × 10	2.00 × 10	99.7%
Example 3	7.10 × 10	6.20 × 10	91.3%
Example 4	7.10 × 10	< 10	100.0%
Example 5	7.10 × 10	1.40 × 10	98.2%
Example 6	7.10 × 10	< 10	100.0%
Example 7	7.10 × 10	4.00 × 10	99.4%

Experimental example 2

After washing the toy, so manufactured from the examples 1 and 2, by a washer, the antibacterial activity was measured in the same procedure as described in the experimental example, and the results thereof are shown in the following tables 3 and 4.

Table 3.

Antibacterial activity of a tiger stuffed/plush toy

Washing time (5 minutes), addition of surfactant, washing frequency (30 days), and standard testing bacteria KCTC 1927						
Washing frequency	1 time	2 times	3 times	4 times	5 times	6 times
Bactericidalrate	99.6%	99.6%	99.4%	99.4%	99.4%	99.3%

Table 4.

Antibacterial activity of a bear stuffed/plush toy

Washing time (5 minutes), addition of surfactant, washing frequency (30 days), and standard testing bacteria KCTC 1927						
Washing frequency	1 time	2 times	3 times	4 times	5 times	6 times
Bactericidal rate	98.2%	98.0%	97.9%	97.5%	97.5%	97.4%

As noted in the above tables 1 and 2, the antibacterial-treatment toy of this invention demonstrated better antibacterial effects than the conventional comparison fabrics. With excellent antibacterial effects as revealed in the above tables 3 and 4, the antibacterial-treatment toy of this invention can have a semi-permanent antibacterial activity on the stuffed/plush toy.

Therefore, this invention is characterized in that the fabric materials of the stuffed/plush toy are treated and fixated with the antibacterial chemical which is colorless, transparent and unharmful to the human body. In particular, the unharmful antibacterial chemical is added to the particles of the raw material prior to the plastic projection used for an eye, nose, etc. of a stuffed/plush toy for the antibacterial treatment. Further, the sanitary finished stuffed/plush toy of this invention is characterized in that the antibacterial activity may be sustained even after washing in whole, and the stuffed/plush toy has a semi-permanent antibacterial activity, thus maximizing the safety conditions where the infants and children can play with the toy under sanitary environments.

CLAIMS

What is claimed is:

1. A sanitary finished stuffed/plush toy comprising the plastic molding ornaments and fabric materials, wherein said plastic molding ornaments is mixed with α-phosphate zirconium having ion-exchanged silver ion prior to projection and undergoes an antibacterial treatment in the projection-molding state, and said fabric materials are fixated with cationic quaternary ammonium chloride.

2. A sanitary finished stuffed/plush toy according to claim 1, wherein said α-phosphate zirconium having ion-exchanged silver-ion is used in the ratio of 0.1~1 wt % in proportion to the particles of the raw materials.

3. A sanitary finished stuffed/plush toy according to claim 1, wherein said quaternary ammonium chloride is selected from the group consisting of the formaldehyde group, chloride, phenol, alcohol, iodine, epoxide, and the compounds containing silver ion.

4. A sanitary finished stuffed/plush toy according to claim 1, wherein said quaternary ammonium chloride is fixated in the ratio of 3~7 wt % in proportion to the weight of a toy.

5. A method for manufacturing a sanitary finished stuffed/plush toy comprising fabric materials and plastic projection materials, wherein:

the plastic projection molding ornaments are fabricated in such a manner that α-phosphate zirconium having ion-exchanged silver-ion is added to the raw materials prior to projection and mixed at 200~270℃, the mixture of which undergoes a projection molding;

said antibacterial-treated plastic ornaments and fabric materials are assembled by a common sewing method to manufacture a toy;

the stuffed/plush toy is dipped or padded in cationic quaternary ammonium chloride for the antibacterial treatment, after which is dried; and

the air is fluxed onto a toy at 110~120℃ in order to ensure the homogenous state of the toy fiber and the fixation of the antibacterial chemical onto said toy.

6. A method for manufacturing a sanitary finished stuffed/plush toy according to claim 5, wherein said α-phosphate zirconium having ion-exchanged silver-ion is added in the ratio of 0.1~1% by weight in proportion to the particles of raw materials.

7. A method for manufacturing a sanitary finished stuffed/plush toy according to claim 5, wherein said quaternary ammonium chloride, selected from the group consisting of the formaldehyde group, chloride, phenol, alcohol, iodine, epoxide and the compounds having silver ion, is added in the ratio of 3~7% by weight in proportion to the weight of a toy.

8. A method for manufacturing a sanitary finished stuffed/plush toy according to claim 7, wherein said quaternary ammonium chloride is dissolved in water at 1.5%, and the volumetric ratio of water to a toy in the antibacterial-treatment solution is 30 : 1.

INTERNATIONAL SEARCH REPORT

International application No.
PCT/KR 98/00205

A. CLASSIFICATION OF SUBJECT MATTER

IPC[6]: A 63 H 3/02, C 01 B 25/42

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

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Minimum documentation searched (classification system followed by classification symbols)

IPC[6]: A 63 H 3/00, 3/02; C 01 B 25/00, 25/16, 25/26, 25/38, 25/42; D 01 F 1/00, 1/10, 6/88, 6/92, 6/96

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

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0 783 048 A2 (JAPAN EXLAN) 09 July 1997 (09.07.97), page 19, lines 16-31; claims 1,2.	1,5
A	DE 41 22 448 A1 (HUND FRANZ) 07 January 1993 (07.01.93), page 3, lines 55-60; claims 2,3.	1,5
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A	GB 2 110 098 A (JOUETS BOULGOM) 15 June 1983 (15.06.83), abstract; page 2, lines 38-65; claims 1-6; fig. 1-3.	1

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

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Date of the actual completion of the international search	Date of mailing of the international search report
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Name and mailing adress of the ISA/AT Austrian Patent Office Kohlmarkt 8-10; A-1014 Vienna Facsimile No. 1/53424/535	Authorized officer Tsilidis Telephone No. 1/53424/387

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INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No.
PCT/KR 98/00205

In Recherchenbericht angeführtes Patentdokument Patent document cited in search report Document de brevet cité dans le rapport de recherche	Datum der Veröffentlichung Publication date Date de publication	Mitglied(er) der Patentfamilie Patent family member(s) Membre(s) de la famille de brevets	Datum der Veröffentlichung Publication date Date de publication
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