

653385

SPRUSON & FERGUSON

Australia

Patents Act 1990

Patent Request: Standard Patent

We, the Applicant/Nominated Person specified below, request we be granted a patent for the invention disclosed in the accompanying standard complete specification.

[70,71] **Applicant/Nominated Person:**
Kimberly-Clark Corporation, of 401 North Lake Street, Neenah, Wisconsin, 54956,
United States Of America

[54] **Invention Title:**
Radiation Stabilized Fabric Having Improved Odor Characteristics

[72] **Inventor:**
Robert L. Hudson

[74] **Address for Service in Australia:**
Spruson & Ferguson, Patent Attorneys
Level 33 St Martins Tower
31 Market Street
Sydney New South Wales Australia [Code SF]

Basic Convention Application Details

[31]	Application No	[33] Country	[32] Date of Application
	677,226	US	29 March 1991
	Basic Applicant:	Robert L. Hudson	

DATED 5 April, 1994
Kimberly-Clark Corporation

Registered Patent Attorney



INSTR CODE: 56610

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Australia

Patents Act 1990

NOTICE OF ENTITLEMENT

I, Martin Herman Michael,

of Kimberly-Clark Corporation, with offices at 401 North Lake Street,
Neenah, Wisconsin 54957-0349, U.S.A.

being authorised by the Applicant(s)/Nominated Person(s) in respect of
an application entitled:

RADIATION STABILIZED FABRIC HAVING IMPROVED ODOR CHARACTERISTICS

state the following:

1. The Applicant(s)/Nominated Person(s) has/have, for the following
reasons, gained entitlement from the actual inventor(s):

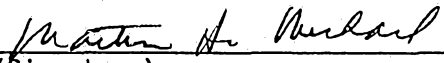
The Applicant/Nominated Person is the assignee of the actual
inventor(s).

2. The Applicant(s)/Nominated Person(s) is/are entitled to rely on the
basic application(s) listed on the Patent Request as follows:

The Applicant(s)/Nominated Person(s) is the assignee of the
basic applicant(s).

3. The basic application(s) listed on the Patent Request is/are the
application(s) first made in a Convention Country in respect of the
invention.

DATED this 17th day of February, 1992


(Signature)

Martin Herman Michael
Vice President and Chief Counsel
(Name & Title)



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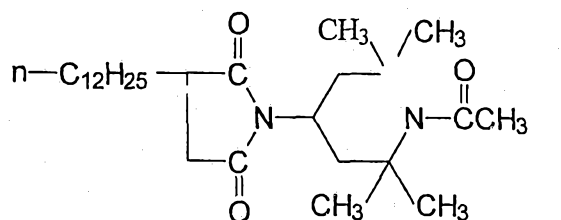
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- (54) Title
RADIATION STABILIZED FABRIC HAVING IMPROVED ODOR CHARACTERISTICS
- International Patent Classification(s)
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677226 29.03.91 US UNITED STATES OF AMERICA
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- (71) Applicant(s)
KIMBERLY-CLARK CORPORATION
- (72) Inventor(s)
ROBERT L. HUDSON
- (74) Attorney or Agent
SPRUSON & FERGUSON, GPO Box 3898, SYDNEY NSW 2001
- (57)

There is disclosed a radiation stabilized fabric of propylene polymer or copolymer of propylene which has improved odor characteristics. Radiation stabilization results from adding by weight 0.25 to 2.0 percent of an acetylated hindered amine light stabilizer known in the art as Cyasorb UV-3668 or by adding by weight 0.25 to 2.0 percent of an oligomeric, hindered amine substituted siloxane such as polymethyl propyl 3-oxy [4- (2, 2, 6, 6-tetramethyl) piperdiny] siloxane.

Claim

1. A radiation stabilised fabric comprising a non-woven web formed of a propylene polymer containing a hindered amine compound, wherein said compound has the formula I:



or is polymethyl propyl 3-oxy [4(2,2,2,6-tetramethyl) piperidinyl] siloxane.

AUSTRALIA
PATENTS ACT 1990

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COMPLETE SPECIFICATION

FOR A STANDARD PATENT

ORIGINAL

Name and Address
of Applicant:

Kimberly-Clark Corporation
401 North Lake Street
Neenah Wisconsin 54956
UNITED STATES OF AMERICA

Actual Inventor(s):

Robert L. Hudson

Address for Service:

Spruson & Ferguson, Patent Attorneys
Level 33 St Martins Tower, 31 Market Street
Sydney, New South Wales, 2000, Australia

Invention Title:

Radiation Stabilized Fabric Having Improved Odor
Characteristics

The following statement is a full description of this invention, including the
best method of performing it known to me/us:-

RADIATION STABILIZED FABRIC HAVING IMPROVED
ODOR CHARACTERISTICS

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Technical Field

The present invention relates to radiation stabilized fabric, and more particularly relates to radiation stabilized polypropylene having improved odor characteristics.

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Background of the Invention

Disposable surgical fabrics for masks, gowns, drapes, towels, and the like are well-known in the art. In order for such fabrics to be acceptable in surgical environments, the fabrics should have good electrical conductivity to prevent static electricity build-up and associated sparking, alcohol repellency, strength, and long shelf-life. To sterilize garments made from such fabrics, it is known to seal the garments within plastic containers and subject the sealed containers to gamma or ionizing radiation. However, it is known that such radiation treatment detrimentally affects the above-enumerated physical properties as well as the odor characteristics of the material.

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To avoid the detrimental effects of the radiation on the physical properties of the fabric, it is known to add radiation stabilizing agents to the fabric during manufacture. These stabilizing agents, however, typically do not inhibit the radiation treatment from imparting an offensive odor to the fabric. One example of a radiation treated fabric which has a reduced odor level compared to unstabilized and stabilized fabrics known in the art is disclosed in United States Patent No. 4,822,666 (hereinafter "the '666 patent"), assigned to Kimberly-Clark Corporation, the assignee of the present invention and incorporated herein by reference. The '666 patent discloses fabrics stabilized using a long chain aliphatic ester of a 3,5-di-t-butyl-4-hydroxybenzoic acid. This stabilizer permits sterilization of the fabric using

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ionizing radiation without breakdown of the physical characteristics of the fabric such as conductivity, strength, and repellency. Experience has shown that fabrics treated in accordance with the '666 patent show a minimal strength loss during sterilisation and in post-irradiation storage. These fabrics also have a reduced odor level as compared to 5 unstabilized or typical stabilised fabrics known in the art. However, such fabrics still have an odor of a level which is sufficiently noticeable so as to desire improvement.

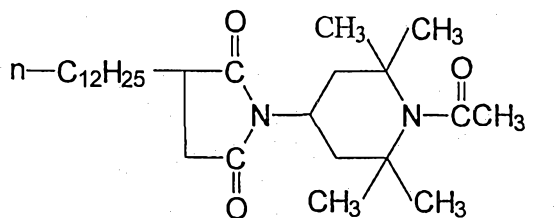
One attempt in the art to reduce the noticeable odor of fabrics treated in accordance with the '666 patent has been to further include an odor mask such as Polyiff 15086-00159 Baby Powder, available from International Flavors and Fragrances, Inc., Hazlet, 10 N.J. The addition of such an odor mask has provided some improvement in the odor level, but such fabrics still have objectionable odor levels with a noticeable rise in odor level about a month after treatment. Therefore, a need exists for a disposable surgical fabric which may be sterilised with ionizing radiation without experiencing a loss of physical properties and without developing an objectionable odor.

Summary Of The Invention

15 The present invention solves the above described need by providing a disposable surgical fabric which may be sterilised by conventional ionising radiation techniques without substantial degradation of its physical properties and without developing an objectionable odor.

20 Generally described, the present invention provides a radiation stabilised fabric comprising a non-woven web formed of a propylene polymer containing an acetylated hindered amine light stabiliser.

According to a first embodiment of the present invention there is provided a radiation stabilised fabric comprising a non-woven web formed of a propylene polymer 25 containing a hindered amine compound, wherein said compound has the formula I:



or is polymethyl propyl 3-oxy [4(2,2,2,6-tetramethyl) piperidinyl] siloxane.

More particularly, the present invention provides a radiation stabilised fabric comprising a non-woven web formed of a propylene polymer containing the compound of 30 Formula I, or Cyasorb UV-3668, in an amount of between about 0.25 to 2.0 percent by weight of the web.



Another aspect of the present invention provides a radiation stabilized fabric comprising a nonwoven web formed of a propylene polymer containing an oligomeric, hindered amine substituted siloxane.

5 Still a more particular aspect of the present invention provides a radiation stabilized fabric comprising a nonwoven web formed of a propylene polymer containing polymethyl propyl 3-oxy [4-(2, 2, 6, 6-tetramethyl) piperdiny] siloxane in an amount of between about 0.25 to 2.0 percent by weight of the
10 web.

Accordingly, an object of the present invention is to provide a radiation stabilized polypropylene or propylene copolymer which has been stabilized against the undesirable effects of ionizing radiation and which does not have an
15 offensive odor.

A further object of the present invention is to provide a radiation stabilized fabric which will maintain, without offensive odor, at least 70% of its initial tensile strength after treatment with ionizing radiation sufficient to
20 sterilize the fabric and after aging.

It is also an object of the present invention to provide a surgical fabric which can be sterilized by gamma radiation without having a resulting offensive odor and without losing its strength, conductivity and alcohol repellency.

25 Other objects, features, and advantages of the present invention will become apparent upon reading the following detailed description of embodiments of the invention, when taken in conjunction with the appended claims.

30 **Detailed Description of the Invention**

A surgical fabric made from polypropylene or a propylene-ethylene copolymer may be stabilized against the harmful effects of ionizing radiation to the physical properties and odor characteristics of the fabric by adding
35 either an acetylated hindered amine light stabilizer or an oligomeric, hindered amine substituted siloxane to the polymer prior to forming the surgical fabric. In one application,

the stabilized surgical fabric consists of a laminate of a melt-blown layer of polypropylene fabric sandwiched between two outside layers of spun-bonded polypropylene. The spun-bonded layers may be prepared in accordance with the processes illustrated by the following patents: Dorschner et al. United States Patent No. 3,692,618; Kinney United States Patent Nos. 3,338,992 and 3,341,394; Levy United States Patent No. 3,502,538; Hartmann United States Patent Nos. 3,502,763 and 3,909,009; Dobo, et al. United States Patent No. 3,542,615; Morman et al. United States Patent No. 4,405,297; and Harmon Canadian Patent. No. 803,714. Spun-bonded materials prepared with continuous filaments generally have at least three common features. First, the polymer is continuously extruded through a spinneret to form discrete filaments. Thereafter, the filaments are drawn either mechanically or pneumatically without breaking in order to molecularly orient the polymer filaments and achieve tenacity. Lastly, the continuous filaments are deposited in a substantially random manner onto the carrier belt to form the web.

The melt-blown interior layer is also conventional and its construction is illustrated by NRL Report 4364, "Manufacture of Super-fine Organic Fibers", by V.A. Wendt, E.L. Boon, and C.D. Fluharty; NRL Report 5265, "An Improved Device for the Formation of Super-Fine Thermoplastic Fibers", by K.D. Lawrence, R.T. Lukas, and J.A. Young; and United States Patent No. 3,849,241, issued November 19, 1974, to Buntin, et al.

A surgical fabric consisting of a melt-blown web sandwiched between spun-bonded webs of polypropylene or propylene copolymers can be made in accordance with Brock et al. United States Patent No. 4,041,203 for "Nonwoven Thermoplastic Fabric." Such a fabric is manufactured by Kimberly-Clark Corporation and is used in health care products sold under the trade-mark SPUNGUARD. For such a surgical fabric, it is customary to treat the nonwoven polypropylene or copolymer web with a surface treatment to provide alcohol repellency and enhance conductivity and thereby inhibit the build up of

static electricity. In order to achieve alcohol repellency and electrical conductivity a doctor roll is used to apply a mixture comprised by weight of about 2.15 percent of a polymeric fluorocarbon, 0.09 percent lithium nitrate, 0.07
5 percent hexanol, and 97.06 percent water to the surface of the fabric. The polymeric fluorocarbon is 3M FC808 manufactured by 3M Company, St. Paul, Minn. The treatment results in a dry add on weight (as a percentage of the web weight) of 0.3 percent for the polymeric fluorocarbon and of 0.03 percent for
10 the lithium nitrate. Such treatment is further described in Hultman et al. United States Patent No. 4,111,605.

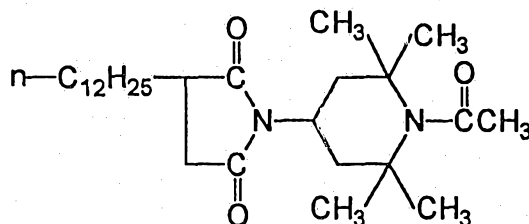
As previously discussed, the surgical fabric is made into surgical products which are sealed in plastic containers and subjected to ionizing radiation in order to render the fabric
15 sterile. Polypropylene and copolymers of propylene, including propylene-ethylene copolymers, are adversely affected by the radiation and lose strength, conductivity and repellency, and develop an objectionable odor.

Early attempts at stabilizing polypropylene and its
20 copolymers focused on hindered amine light stabilizers. While hindered amine light stabilizers, such as Chimassorb 944,^{stabilizer} manufactured by Ciba Geigy Corporation, Hawthorne, N.Y., provide some improvement in stabilization against degradation and strength, they unfortunately cause a loss of conductivity and repellency properties. Some hindered amine light
25 stabilizers, such as Hostavin TMN 20,^{stabilizer} manufactured by American Hoescht Corporation, Somerville, N.J., react with the water repellency treatment to form an objectionable nitrate salt deposit on the surgical fabric.

30 It has been discovered, however, that polypropylene and copolymers of propylene may be stabilized by using an acetylated hindered amine light stabilizer and thereby retain substantially all of the physical properties of the fabric without developing an objectionable odor. The particular
35 stabilizer which has been utilized with success is sold under the trademark Cyasorb UV-3668,^{stabilizer} and manufactured by American Cyanamid Company, Wayne, N. J. In order to achieve the best



results, the Cyasorb UV-3668_{stabilizer} should be added to the polymer or copolymer in amounts ranging from 0.25 to 2.0 percent by weight of the web prior to forming the web. Cyasorb UV-3668_{stabilizer} has a molecular weight of 449, with a formula of:



5 Alternatively, it has also been discovered that similar results may be obtained by using an oligomeric, hindered amine substituted siloxane as a stabilizer. Particularly, such a siloxane is polymethyl propyl 3-oxy [4-(2, 2, 6,6-tetramethyl) piperdiny] siloxane which is sold under the trademark Uvasil-299 and manufactured by Enichem Americas Inc., New York, N.Y. In order to achieve best results, the Uvasil-299 should be added to
10 the polymer or copolymer in amounts ranging from 0.25 to 2.0 percent by weight prior to forming the web. It will be understood that the stabilizers of the present invention may be added to the fabric as described in Example 2 of the '666 patent, from which the Cyasorb-2908 has been omitted.

Odor tests were performed which compared the odor of fabrics having the stabilizers
15 of the present invention to fabric having the stabilizer of the '666 patent (sample 766) and to unstabilized fabric (sample 867). The fabrics tested were spunbond fabrics formed utilizing standard manufacturing methods. The test results are shown in Table 1.

TABLE 1

Sample	Composition	Odor Rating
867	Exxon 3435 RG	4.5
766	Exxon 3435RG with 2.0% SCC 5065 by weight of the fabric	2.9



and 1.0% Cyasorb UV-2908^{stabilizer} by weight of the fabric

5 842 Exxon 3435RG with 2% SCC 1.7
5065 by weight of the fabric
and 1.0% Cyasorb UV-3668^{stabilizer} by weight of the fabric

10 841 Exxon 3435 RG with 2% SCC 1.1
5065 by weight of the fabric
and 1.0% Uvasil-299^{stabilizer} by weight of the fabric

15 Exxon 3435 RG is a polypropylene resin available from Exxon Company U.S.A., Houston, Texas.

SCC 5065 is a neutralizing agent (calcium stearate) available from Standridge Color Corporation, Social Circle, Georgia. SCC 5065 has no effect on odor.

20 Odor rating was a subjective test carried out by panels who rated the odor level from 0 (no odor) to 6 (strong odor).

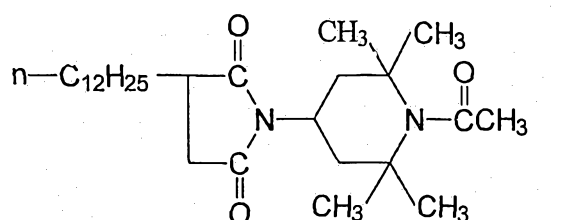
The foregoing description relates to preferred embodiments of the present invention, and modifications or alterations may be made without departing from the spirit and scope of the invention as defined in the following claims.

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The claims defining the invention are as follows:

1. A radiation stabilised fabric comprising a non-woven web formed of a propylene polymer containing a hindered amine compound, wherein said compound has the formula I:



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or is polymethyl propyl 3-oxy [4(2,2,2,6-tetramethyl) piperidinyl] siloxane.

2. The fabric of claim 1 or claim 2, wherein the propylene polymer is polypropylene.

3. The fabric of claim 1 or claim 2, wherein the propylene polymer is polypropylene-ethylene copolymer.

4. The fabric of any one of claims 1 to 3, wherein the hindered amine compound having formula I is present in the web in an amount of between 0.25 to 2.0 percent by weight of the web.

5. The fabric of any one of claims 1 to 3, wherein the siloxane is present in the web in an amount of between 0.25 to 2.0 percent by weight of the web.

6. A radiation stabilised fabric, substantially as herein described with reference to Sample 842 or 841.

Dated 20 May, 1994
Kimberly-Clark Corporation

Patent Attorneys for the Applicant/Nominated Person
SPRUSON & FERGUSON



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RADIATION STABILIZED FABRIC HAVING IMPROVED ODOR
CHARACTERISTICS

Abstract of the Disclosure

There is disclosed a radiation stabilized fabric of propylene polymer or copolymer of propylene which has improved odor characteristics. Radiation stabilization results from adding by weight 0.25 to 2.0 percent of an acetylated hindered amine light stabilizer known in the art as Cyasorb UV-3668 or by adding by weight 0.25 to 2.0 percent of an oligomeric, hindered amine substituted siloxane such as polymethyl propyl 3-oxy [4- (2, 2, 6, 6-tetramethyl) piperdiny] siloxane.