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(54) Title: FILM STRUCTURE		
(57) Abstract <p>A film structure comprises a first outer skin layer (a) of an olefin co- or terpolymer having an external surface which is sealable and machinable, the first skin layer containing a non-migratory particulate cross-linked hydrocarbyl substituted polysiloxane, and which is located on one side of a core olefinic polymer layer (b); on an opposite side of the core layer there is a second skin layer (c) which is ethylene homopolymer and which is free of the particulate cross-linked hydrocarbyl-substituted polysiloxane of the first skin layer, the second skin layer. In one embodiment, for improved barrier properties, the ratio of particle size to thickness of the (a) skin layer ranges from 1.15 to 2.5.</p>		

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FILM STRUCTURE

This invention relates to the field of polymer films. It more particularly relates to a sealable biaxially oriented composite film structure in which the sealable skin layer contains particulate crosslinked hydrocarbyl substituted polysiloxane.

In the packaging of certain types of foods, such as snack foods including candies, potato chips, cookies and the like, it is common practice to employ a multi-layer film.

Polypropylene films are widely used in the packaging industry due to their superior physical properties, such as, transparency, stiffness, moisture barrier characteristics and others. Despite these highly desirable properties, unmodified polypropylene film has the disadvantageous property of having a high inherent coefficient of friction and film-to-film destructive blocking on storage. This high film-to-film coefficient of friction makes polypropylene films difficult to be successfully employed in automatic packaging equipment in their unmodified form.

Coefficient of friction characteristics of polypropylene and other thermoplastic films are beneficially modified by the inclusion in the polymer of slip agents. Most of these slip agents are migratory, such as polydialkyl siloxane or fatty amides, such as, erucamide and oleamide. Although they do reduce the coefficient of friction, their effectiveness depends upon the ability to migrate to the surface of the film. The development of the desired low coefficient of friction value is strongly dependent upon the type and amounts of amides, and time and temperature aging effects. Even the heat history of the film while in storage and shipping and during subsequent converter processes, significantly affects the coefficient of friction. In addition, the presence of these types of fatty acid amides on the film surface results

5 in visible adverse appearance effects, manifested by an increase in haze, a decrease in gloss and the presence of streaks. These materials also adversely effect the wettability and adhesion of solvent and water-based inks, coatings and adhesives.

10 To overcome the problems associated with migratory slip agents, non-migratory systems were developed. A material described to be a non-migratory slip agent is a particulate crosslinked hydrocarbyl-substituted polysiloxane which is available worldwide from Toshiba Silicone Co., Ltd. and in the
15 United States from General Electric Co. and marketed under the name TOSPEARL

In PCT/US94/14280 a film structure containing a non-migratory particulate crosslinked hydrocarbyl-substituted polysiloxane slip agent is described. The film structure
20 includes at least one layer of an olefin homo-, co- or terpolymer having a surface-treated external surface which is printable, sealable and machinable and as combined slip agent and antiblock a non-migratory particulate crosslinked hydrocarbyl-substituted polysiloxane, and/or liquid
25 polydimethyl siloxane. Example 7 provides a polypropylene core layer having (a) an outer skin layer of high density polyethylene containing particulate crosslinked polymonoalkyl-siloxane as non-migratory combined antiblock and slip agent and low density polyethylene. On the other side of the core
30 layer is (c) an outer layer resin which also contains the non-migratory combined antiblock and slip agent. The film is flame treated on one side to improve the wettability and printability and lamination strengths. The size of the particulate in terms of average diameter is 4.5 microns and
35 the target skin thickness of the (a) layer is three gauge units and four gauge units for the (c) layer so the ratio of particle size in terms of average diameter to skin thickness is 5.9 for the three gauge skin layer and 4.42 for the four

gauge skin layer. The film is described as having good coefficient of friction, on the treated side, and marginal machinability.

Additional descriptions of olefinic polymer films in which particulate siloxane resins are employed to provide improved films will be found in U.S. Patent Nos. 4,966,933; 4,769,418; 4,652,618; and 4,594,134.

U.S. Patent No. 4,966,933 describes a propylene polymer film containing 100 parts by weight of a propylene polymer, 0.01 to 0.5 parts by weight of a fine powder of a crosslinked silicone resin and 0.3 to 3.0 parts by weight of a hydroxy-fatty acid glyceride. In column 3, lines 6-20, the provided amounts of fine powder of silicone resin and hydroxy-fatty acid glyceride in the metallization layer are required for adaptability to vacuum deposition. example 3 provides a two-layer coextruded film in which the fine powder of crosslinked silicone resin is compounded with polypropylene homopolymer to form a metallization layer (B) and the fine powder of crosslinked silicone resin is compounded with an ethylene/propylene/butene-1 copolymer to form a skin layer (a). The ratio of reported particle size to skin thickness is 0.143 for skin layer (B) and 1.29 for skin layer (A).

The above discussion of documents, acts, materials, devices, articles and the like is included in this specification solely for the purpose of providing a context for the present invention. It is not suggested or represented that any or all of these matters formed part of the prior art base or were common general knowledge in the field relevant to the present invention as it existed in Australia before the priority date of each claim of this application.

Throughout the description and claims of the specification the word "comprise" and variations of the word, such as "comprising" and "comprises", is not intended to exclude other additives, components, integers or steps.

This invention provides a film which has low coefficient of friction, for good machinability, good heat sealability, low haze, good gloss (of unmetallized film), nonblocking properties, reduced appearance defects and good to excellent barrier properties.

More specifically, the invention provides a film structure which includes an olefinic polymer core layer having at least one skin layer comprising an olefin polymer having an external surface which is sealable and machinable, the layer containing a non-migratory particular crosslinked hydrocarbyl-substituted



polysiloxane. Particular preferred particulate crosslinked hydrocarbyl-substituted polysiloxanes include the polymonoalkylsiloxanes. On the other side of the olefin polymer core layer there is an olefinic polymer layer having an external surface which is free of the non-migratory particulate crosslinked hydrocarbyl-substituted polysiloxane. The non-migratory slip agent does not, to any meaningful degree, effect film barrier properties or lamination bond strengths to other oriented polypropylene based films or polyester based films.

In a further aspect the present invention provides a film structure comprising a first outer skin layer (a) having an external surface which is sealable, comprising a propylene co- or terpolymer and a non-migratory particulate crosslinked hydrocarbyl substituted polysiloxane, on one side of a core olefinic polymer layer (b), and on an opposite side of the core layer (b), a second skin layer (c) which is free of the particulate crosslinked hydrocarbyl substituted polysiloxane of the first skin layer, the ratio of particle size to thickness of the (a) skin layer ranges from 1.25 to 2.5.

The invention further relates to a method of making a film comprising the step of coextruding a film structure, the film structure comprising a heat sealable layer (a) comprising an olefinic co- or terpolymer containing a particular crosslinked hydrocarbyl-substituted polysiloxane; a core layer (b) comprising an olefinic polymer and an outer layer (c) comprising an ethylene homopolymer which is free of the particulate crosslinked hydrocarbyl-substituted polysiloxane layer (a).

By improved machinability it is meant that the film exhibits a low coefficient of friction and has improved anti-slip and non-blocking characteristics.

The film structure comprises an upper heat sealable layer comprising an olefinic copolymer or terpolymer having an external surface which is sealable and machinable, the layer containing, as slip agent, a particulate crosslinked



5 hydrocarbyl-substituted polysiloxane, a core layer comprising an olefinic polymer, and a lower layer comprising an olefinic homopolymer.

A particularly preferred polymer employed as the core layer of the film herein is polypropylene, particularly highly isotactic polypropylene. The preferred polypropylenes are well known in the art. Typically, they are formed by polymerizing propylene in the presence a stereospecific catalyst system. They can have a melt index at 230°C ranging from 0.1-25. The crystalline melting point is usually 160°C. 15 The number average molecular weight typically ranges from 25,000 to 100,000. The density typically ranges from 0.90-0.91.

For descriptive purpose only, the film structures of the present invention will be described as having an upper skin layer (a), a core layer (b) and a lower skin layer (c). As 20 may be appreciated by those skilled in the art, the use of the terms upper and lower to refer to particular skin layers is merely relative. Moreover, although referred to as skin layers, the upper and lower layers may have additional structures bonded thereto, based on the functional 25 requirements of the overall structure.

The polymer materials which are contemplated for use in forming skin layer (a) are suitably exemplified by heat sealable polyolefinic copolymers and terpolymers and blends thereof. The copolymers are exemplified by and include block 30 copolymers, for example of ethylene and propylene, random copolymers, for example of ethylene and propylene. The terpolymers are exemplified by ethylene-propylene-butene-1 terpolymers. Also, heat sealable blends can be utilized in providing layer (a). Thus, along with the copolymer or 35 terpolymer there can be polypropylene homopolymer, e.g. one which is the same as, or different from, the polypropylene

5 homopolymer constituting core layer (b) or other material which does not impair the heat sealability of this layer.

Suitable ethylene-propylene-butene-1 (EPB) terpolymers are those obtained from the random inter-polymerization of from 1 to 8 weight percent (wt.%) ethylene, preferably from 3
10 to 7 wt.% ethylene with from 1 to 10 wt.% butene-1, preferably from 2 to 8 wt.% butene-1 with propylene representing the balance. The foregoing EPB terpolymers are for the most part characterized by a melt index at 230°C of from 2 to 16 and advantageously from 3 to 7, a crystalline melting point of
15 from 100°C to 140°C, an average molecular weight of from 25,000 to 100,000 and a density within the range of from 0.89 to 0.92 gm/cm³.

The ethylene-propylene (EP) random copolymers generally contain from 2 to 8 wt.% ethylene, specifically 3 to 7 wt.%
20 ethylene, the balance being made up of propylene. The copolymers can have a melt index at 230°C generally ranging from 2 to 15 and preferably from 3 to 8. The crystalline melting point is usually from 125°C to 150°C and the number average molecular weight range is from 25,000 to 100,000. The
25 density will usually range from 0.89 to 0.92 gm/cm³.

In general, when blends of EPB terpolymer and EP random copolymer are used, such blends will contain from 10 to 90 wt.% EPB terpolymer and preferably from 40 to 60 wt.% EPB terpolymer, the balance being made up of EP random copolymer.

30 Prior to extrusion, in accordance with the present invention, the heat seal layer (a) is compounded with an effective amount of a slip agent. Preferred non-migratory slip agents are selected from the group of particulate crosslinked hydrocarbyl-substituted polysiloxanes.
35 Particularly preferred are the particulate crosslinked polymonoalkylsiloxanes. Most particularly preferred are non-melttable polymonoalkylsiloxanes characterized as having a mean particle diameter of 0.5 to 20.0 microns, typically determined

5 by known scanning electron micrograph measurement techniques,
and a three dimensional structure of siloxane linkages. Such
materials are commercially available from Shin Etsu under
various product designations and from Toshiba Silicone Co.,
Ltd., worldwide, and in the United States from General
10 Electric Co., and are marketed under the tradename Tospearl.
Particulate, spherical materials comprising acryl resins such
as EPOSTAR manufactured by Nippon Shokubai Co., Ltd., are also
contemplated. Other commercial sources of similar suitable
materials are also known to exist. Especially preferred are
15 the spherical particulates ranging in size from 2 to 5
microns. By non-migratory, it is meant that these
particulates do not change location throughout the layers of
the film in the manner of the migratory slip agents, e.g.
polydialkylsiloxane or fatty amides. The amount employed
20 typically ranges from 0.1% to 0.4% by weight, more
specifically about 0.15% to 0.3% by weight, based upon the
entire weight of the skin layer resin.

Preferred for use in forming lower skin layer (c) are
polymeric materials. Typical examples of such materials are
25 those selected from the group consisting of ethylene polymers
such as linear low density polyethylene (LLDPE), low density
polyethylene (LDPE), medium density polyethylene (MDPE), high
density polyethylene (HDPE) or blends thereof. Other
contemplated resins include ethylene-vinyl alcohol copolymer
30 (EVOH), ethylene-vinyl acetate copolymer (EVA) and
polypropylene homopolymer. High density polyethylene is a
particularly preferred polymeric material for forming this
skin layer. In general, the density ranges from between 0.94
to 0.96 g/cm³ and over. This skin layer is formed without
35 adding the non-migratory particulate, which is included in the
formulation of skin layer (a). Thus, skin layer (c) is
considered to be free of the non-migratory particulate used in
skin layer (a). This does not however, exclude the incidental

5 presence of non-migratory particulate which might occur upon
subsequent handling of the finished film, for example upon
winding the film onto a roll, whereby non-migratory
particulates from skin layer (a) might be sloughed onto the
external surface of or imbedded into skin layer (c). In one
10 embodiment of the invention the skin layer (c) consists
essentially of high density polyethylene.

Either or both layers (a) and (c) can also contain
pigments, fillers, stabilizers, light protective agents or
other suitable modifying ingredients if desired. Further,
15 skin layers (a) and/or (c) can optionally contain a minor
amount of an additional antiblock material, such as, clays,
talc, glass, and the like. These antiblock materials can be
used alone, or different sizes and shapes can be blended to
optimize machinability. The major proportion of these
20 particles, for example, anywhere from more than half to as
high as 90 wt.% or more, will be of such a size that a
significant portion of their surface area, will extend beyond
the exposed surface of such skin layer.

Core layer (b) can contain anti-static agents, e.g.,
25 cocoamine or N,N bis(2-hydroxyethyl) sterylamine. Suitable
amines include mono-, di, or tertiary amines.

Core layer (b) will usually represent from 70 to 95% of
the thickness of the overall film laminate or an even higher
percentage thereof. Typically, upper skin layer (a) and lower
30 skin layer (c) are coextensively applied to each major surface
of core layer (b), usually by being coextruded directly
thereon.

In any event, in forming the three layer structure layers
(a), (b) and (c) can be coextruded from a conventional
35 extruder through a flat sheet die, the melt streams being
combined in an adapter prior to being extruded from the die.
Each of the skin layers (a) and (c) can comprise, for example,
approximately 6.0% of the total thickness of the laminate.

5 After leaving the die orifice, the laminate structure is chilled and the quenched sheet is then heated and stretched, e.g., five to eight times in the machine direction (MD) and then subsequently, for example, eight to twelve times in the transverse direction (TD). The edges of the film can be
10 trimmed. The film laminate is then, usually, wound on a reel.

As a result of the biaxial orientation of the film structure herein, several physical properties of the composite layers, such as flex-crack resistance, Elmendorff tear strength, elongation, tensile strength, impact strength and
15 cold strength properties, are improved.

The overall thickness of the laminate is not critical and advantageously can range from 5 microns to 60 microns.

When an opaque label or film structure is desired, the core layer of the film structure of the present invention may
20 be formed in accordance with U.S. Patent No. 4,377,616.

Where opacifying agents are desired, they may be incorporated in the core composition of this invention, in a proportion of up to 10%, preferably at least 1%, by weight. Suitable conventional opacifying agents can be added to the
25 melt mixture of the core polymer before extrusion thereof into a film. Opacifying compounds are generally well known in this area. They may be exemplified by iron oxides, carbon black, aluminum, aluminum oxide, titanium dioxide, and talc.

The processability and machinability of the film may be
30 further enhanced by the inclusion of the polymeric material used to form one or both skin layers of a small percentage of finely subdivided inorganic material. Such inorganic material not only can impart antiblock characteristics to the multi-layer film structure of the present invention, but also can
35 further reduce the coefficient of friction of the resultant film.

Contemplated finely divided inorganic materials, referred to above may be exemplified by: syloid, a synthetic amorphous

5 silica gel, having a composition of 99.7% SiO₂; diatomaceous earth having a composition of, for example, 92% SiO₂, 3,3% Al₂O₃, and 1.2% Fe₂O₃ which has an average particle size of 5.5 microns, which particles are porous and irregularly shaped; dehydrated kaolinite (Kaopolite SF) having a composition of
10 55% SiO₂, 44% Al₂O₃, which has an average particle size of 0.7 microns, and which particles are thin flat platelets; and synthetic, precipitated silicates, for example Sipernat 44, a material having a composition of 42% SiO₂, 36% Al₂O₃, and 22% Na₂O.

15 The polyolefin blends used to coextrude the multi-layer high opacity film structures contemplated herein are suitably formed by employing commercially available intensive mixers, such as those of the Bolling or Banbury type.

Typically the surface of skin layer (c) is treated by
20 corona or flame treatment.

The resulting film has low water vapor transmission rate characteristics and low oxygen transmission rate characteristics. These improved physical properties make the film ideally suited for packaging food products, even those
25 comprising liquids.

In one aspect of the invention, an important feature is the ratio of the thickness of the skin layer to the size of the particulate crosslinked hydrocarbyl-substituted polysiloxane and the thickness of the skin layer. The typical
30 ratio, in terms of average particulate to skin thickness is from 1.25 to 2.5, specifically from 1.5 to 2.00. When the ratio of particulate to skin thickness is above 2.5, the barrier properties of the film deteriorate. When the ratio is lower than 1.5 machinability deteriorates.

35 EXAMPLES

The following specific examples demonstrate particular aspects of the present invention. Unless indicated to be on some other basis, all parts and percentages are by weight.

5 Particulate sizes are reported by the manufacturers as being determined by measuring the diameter of the particles by scanning electron micrograph.

Coefficient of friction values referred to herein are determined according to the procedure of ASTM D-1894-78, using
10 TMI equipment (without delay). Haze and gloss values referred to herein are determined according to the procedures of ASTM D-1003-61 and D-2457-70, respectively.

Minimum seal temperature is determined using a Wrap-Aide Crimp Sealer Model J or K. The crimped sealer is set to a
15 dial pressure of 20, dwell time of 0.75 seconds and starting temperature of 93°C. A film specimen is prepared so that when two surfaces are placed together the resulting film is approximately 6.35 cm in the transverse direction by 7.62 cm in the machine direction. The specimen is then inserted
20 squarely, smoothly and flatly into the crimp sealer jaws so that a small amount protrudes beyond the back end of the jaws. The transverse direction of the film is parallel to the sealer jaws.

The jaws are closed and immediately after the sealing bar
25 rises the specimen is removed from the jaws of the sealer. A JDC-type cutter is used to cut the film into a one inch strip. The amount of force needed to separate the seal is determined on an Alfred-Suter crimp seal strength testing unit. The amount of force needed to pull the seal apart is recorded in
30 N/m. In order to determine the minimum temperature required to form a seal requiring 77.03 N/m peel force, the crimp seals are formed at temperatures raised by 2.8 degree increments until one temperature yields a seal value of less than 77.03 N/m and the next temperature yields a seal value of greater
35 than or equal to 77.03 N/m.

A chart method (using an established chart) for a 77.03 N/m minimum seal temperature (MST) is used or a calculation is

5 used. However, in the examples, the chart method was used.
In the calculation method the following equation is employed:
[$\{(77.03 \text{ N/m-VI}) \text{ --- } (V2-VI)\} \times (2.8)$] + TI = MST in °C;

where

VI = seal value obtained prior to achieving 77.03 N/m

10 V2 = seal value obtained subsequent to achieving 77.03
N/m

2.8 = 2.8°C increment in seal temperature

TI = temperature prior to achieving 77.03 N/m.

Examples 1-2

15 In these examples a coextruded biaxially oriented film
structure is produced in which the first skin layer contains
two different loadings of non-migratory slip agent in a ratio
of particulate size in terms of mean particle diameter to skin
thickness of 1.6.

20 Example 1

A core layer of polypropylene (sold by Himont under the
product designation PH-384) is coextruded with an ethylene-
propylene copolymer sealant layer (sold by Fina under the
product designation EOD-94-21) containing 1500 ppm of (0.15%
25 by weight) non-migratory particulate crosslinked hydrocarbyl-
substituted polysiloxane slip agent (sold by Shin Etsu under
the product designation KMP-590). The average diameter of the
particulates is 2.5 microns. On the other side of the core
layer, a high density polyethylene skin layer (sold by Exxon
30 under the product designation HX0353.67) is coextruded. The
film is oriented 5 times in the machine direction and 8 times
in the transverse direction. The final film has a thickness
of 17.78 microns. The seal skin layer thickness is about 1.25
microns while the high density polyethylene skin thickness is
35 0.5 microns.

Example 2

A film identical to the film of Example 1 is produced
except that the amount of non-migratory particulate

5 crosslinked hydrocarbyl substituted polysiloxane is 3000 ppm (0.3% by weight). The performance of the films of Examples 1 and 2 is reported in Table 1.

Table 1

Additive Loading (ppm)	Minimum Seal Temperature (°C)	Coefficient of Friction (constant velocity)	% Haze	% Gloss
Example 1 1500	96.7	0.52	1.85	94.4
Example 2 3000	98.3	0.46	2.55	90.5

10 Examples 3-4

In these examples two film samples are made as described in Example 1 except that the particulate is 4 to 5 microns average diameter (sold by Shin Etsu under the product designation X-52-1186). The ratio of particle size to skin
15 thickness is from 2.63 to 3.29.

In Example 3 the particulate loading is 1500 (0.15 wt.%).
In Example 4 the particulate loading is 3000 (0.30 wt.%).
The performance of these films is reported in Table 2.

Table 2

Additive Loading (ppm)	Minimum Seal Temperature (°C)	Coefficient of Friction (constant velocity)	% Haze	% Gloss
Example 3 1500	98.9	0.43	1.85	91.3
Example 4 3000	100.6	0.36	2.55	89.8

20

Examples 5-6

In these examples two films are prepared as described in Example 1 except that the seal layer is an ethyylene-propylene-butene-1 terpolymer. In Example 5, the seal layer
25 contains 3000 ppm (0.3 wt.%) of the non-migratory particulate crosslinked hydrocarbyl-substituted polysiloxane having an

5 average diameter of 2.5 microns (sold by Shin Etsu under product designation KMP-590). As in Examples 1 to 2, the ratio of particle size to skin thickness is 1.6. In Example 6, the seal layer contains 3000 ppm of similar non-migratory particulates having an average diameter of 4 to 5 microns
 10 (sold by Shin Etsu under the product designation X-52-1186). As in Examples 3 to 4, the ratio of particle size to skin thickness is 2.63 to 3.29. The performance of the films is reported in Table 3.

Table 3

Particulate Average Diameter (microns)	Minimum Seal Temperature (°C)	Coefficient of Friction (constant velocity)	% Haze	% Gloss
Example 5 2.5	98.3	0.48	2.00	90.3
Example 6 4-5	99.4	0.36	2.10	90.8

15

Examples 7-10

In these Examples a film similar to that described in Example 1 is produced except that a 4 micron average diameter non-migratory particulate crosslinked hydrocarbyl-substituted polysiloxane antiblock is added (sold by GE under the product
 20 designation Tospearl 145). The ratio of particle size to skin thickness is 2.63.

In Example 7, 1500 ppm (0.15 wt.%) of Tospearl 145 is added to the copolymer sealant layer.

25 In Example 8, 3000 ppm (0.3 wt.%) of the Tospearl 145 is added to the copolymer sealant layer.

In Examples 9 and 10 the sealant layer is an ethylene-propylene-butene-1 terpolymer (sold by Montell under the product designation KT-225P). The Tospearl 145 is added to a
 30 loading of 1500 ppm (0.15 wt.%) in Example 9 and 3000 ppm (0.3 wt.%) in Example 10.

5 The performance of the films of these examples is reported in Table 4.

Table 4

Example	Minimum Seal Temperature (°C)	Coefficient of Friction (constant velocity)	% Haze	% Gloss
7	102.2	0.44	1.40	92.1
8	102.2	0.37	1.70	91.2
9	99.4	0.40	1.45	92.3
10	99.4	0.32	1.75	91.8

10 It can be seen from the results reported in the foregoing examples that the film products of this invention demonstrate acceptable seal temperatures, excellent machinability, low haze and high gloss.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:

1. A film structure comprising a first outer skin layer (a) having an external surface which is sealable, comprising a propylene co- or terpolymer and a non-migratory particulate crosslinked hydrocarbyl substituted polysiloxane, on one side of a core olefinic polymer layer (b), and on an opposite side of the core layer (b), a second skin layer (c) which is free of the particulate crosslinked hydrocarbyl substituted polysiloxane of the first skin layer, the ratio of particle size to thickness of the (a) skin layer ranges from 1.25 to 2.5.

10

2. A film structure according to claim 1 in which the particulate crosslinked hydrocarbyl-substituted polysiloxane of layer (a) is a crosslinked polymonoalkylsiloxane.

3. A film structure according to claim 1 or claim 2 in which the particulate crosslinked non-melttable polymonoalkylsiloxane is characterized as having an average particle diameter of 0.5 to 20 microns.

4. A film structure according to any one of the preceding claims in which the propylene co- or terpolymer of skin layer (a) is selected from the group consisting of ethylene-propylene copolymers and ethylene-propylene-butene-1 terpolymers.

5. A film structure according to any one of the preceding claims in which the olefinic polymer of the core layer is polypropylene.

25

6. A film structure according to claim 1 substantially as hereinbefore described with reference to any of the examples.

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