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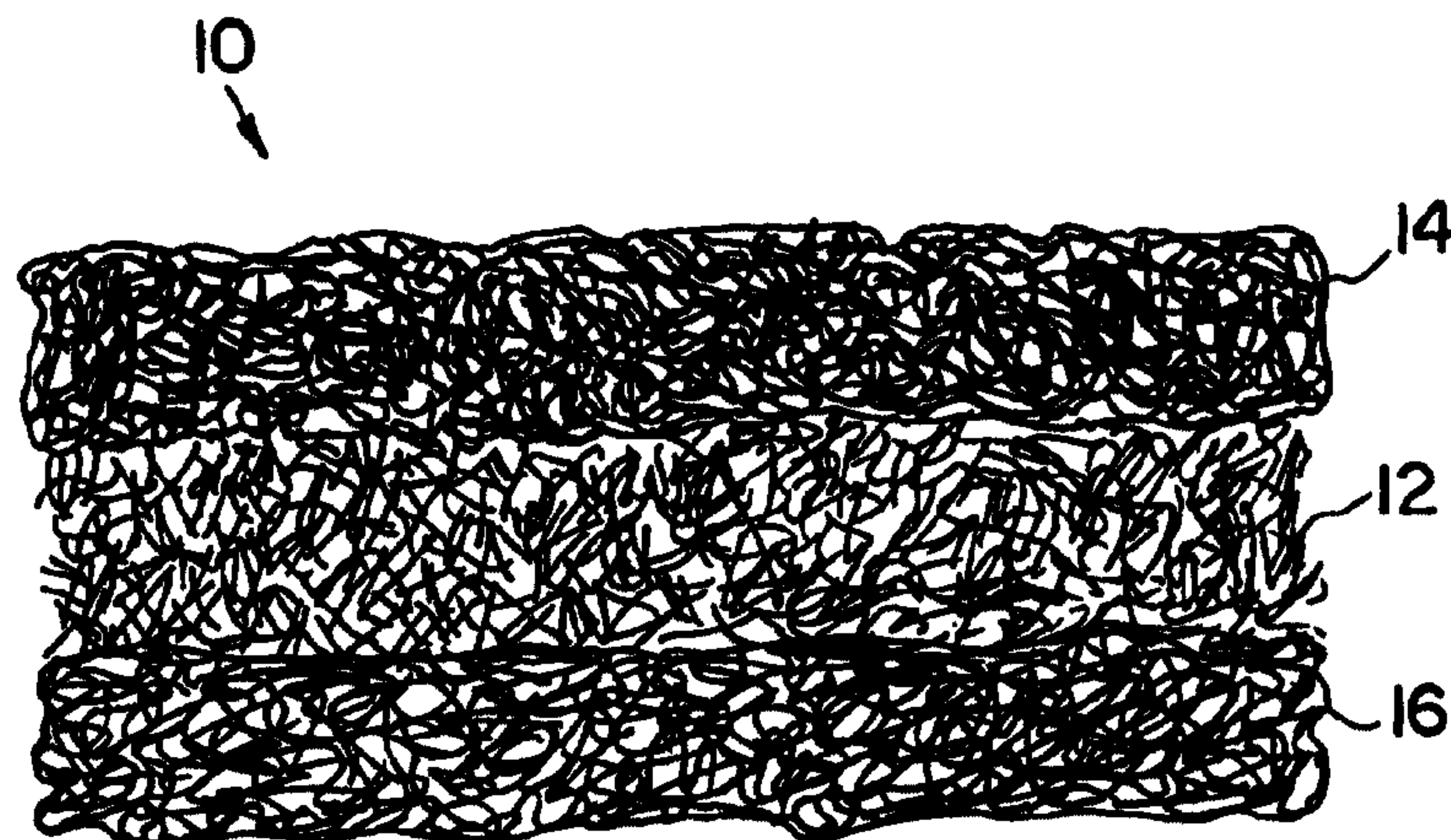
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(54) **BANDE EN NON-TISSE DE FUSION-SOUFFLAGE ET SON  
PROCEDE DE FABRICATION**

(54) **MELTBLOWN NONWOVEN WEB AND PROCESS FOR  
MAKING THE SAME**



(57) L'invention concerne un procédé amélioré servant à fabriquer des bandes en non-tissé de fusion-soufflage. On fabrique cette bande à partir d'un polymère thermoplastique catalysé par un complexe organométallique. Dans un mode de réalisation, par exemple, ce polymère est un polypropylène dont le fluage est inférieur à 1.000 grammes par 10 minutes et qui présente une plage relativement étroite de distribution de poids moléculaires. On peut utiliser ces bandes en non-tissé de fusion-soufflage dans une variété de domaines d'application et elles sont particulièrement bien adaptées à la production de stratifiés. On peut, par exemple, dans un mode de réalisation, combiner cette bande en non-tissé de fusion-soufflage avec au moins une bande de non-tissé filé-lié afin de créer un stratifié de non-tissé utile, par exemple, pour des torchons, des serviettes, des éléments d'habillement, des produits absorbant les liquides.

(57) An improved process for producing nonwoven meltblown webs is disclosed. In particular, the meltblown web are made from a metallocene catalyzed thermoplastic polymer. For instance, in one application, the metallocene catalyzed polymer is polypropylene having a melt flow of less than 1,000 grams per 10 minutes and a relatively narrow molecular weight distribution range. The meltblown webs can be used in a variety of applications and are particularly well suited for use in the construction of laminates. For example, in one embodiment, the meltblown web can be combined with at least one spunbond web to form a nonwoven fabric laminate useful for wipers, towels, garments, liquid absorbent products and the like.



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<p>(21) International Application Number: PCT/US98/17771 (22) International Filing Date: 27 August 1998 (27.08.98) (30) Priority Data: 08/921,427 29 August 1997 (29.08.97) US (71) Applicant: KIMBERLY-CLARK WORLDWIDE, INC. [US/US]; 401 North Lake Street, Neenah, WI 54957 (US). (72) Inventor: BURTON, Robert, M.; 3655 Milton Park Drive, Alpharetta, GA 30202 (US). (74) Agents: CASSIDY, Timothy, A. et al.; Dority &amp; Manning, P.A., P.O. Box 1449, Greenville, SC 29602-1449 (US).</p>	<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, GH, GM, HR, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, SL, TJ, TM, TR, TT, UA, UG, UZ, VN, YU, ZW, ARIPO patent (GH, GM, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, GW, ML, MR, NE, SN, TD, TG).</p> <p><b>Published</b> <i>With international search report. Before the expiration of the time limit for amending the claims and to be republished in the event of the receipt of amendments.</i></p>	
<p>(54) Title: MELTBLOWN NONWOVEN WEB AND PROCESS FOR MAKING THE SAME</p>		
<p>(57) Abstract</p> <p>An improved process for producing nonwoven meltblown webs is disclosed. In particular, the meltblown web are made from a metallocene catalyzed thermoplastic polymer. For instance, in one application, the metallocene catalyzed polymer is polypropylene having a melt flow of less than 1,000 grams per 10 minutes and a relatively narrow molecular weight distribution range. The meltblown webs can be used in a variety of applications and are particularly well suited for use in the construction of laminates. For example, in one embodiment, the meltblown web can be combined with at least one spunbond web to form a nonwoven fabric laminate useful for wipers, towels, garments, liquid absorbent products and the like.</p>	<div style="text-align: center;"> </div>	

**MELTBLOWN NONWOVEN WEB AND PROCESS  
FOR MAKING THE SAME  
Field of the Invention**

The present invention is generally directed to  
5 meltblown nonwoven webs, laminates containing  
meltblown nonwoven webs, and to a process for  
forming the webs. More particularly, the present  
invention is directed to a meltblown nonwoven web  
made from a metallocene catalyzed polymer. For  
10 instance, in one embodiment, the metallocene  
catalyzed polymer is polypropylene having a melt  
flow of less than 1000 g/10 min. and a molecular  
weight distribution of less than about 3.0.

**Background of the Invention**

15 Nonwoven fabric laminates are useful for a  
wide variety of applications. For instance, such  
nonwoven fabric laminates are useful for wipers,  
towels, industrial garments, medical garments,  
medical drapes, and the like. In heavier basis  
20 weights, the laminates are used in recreational  
applications such as tents and as car covers.  
Disposable fabric laminates have achieved  
especially widespread use in hospital operating  
rooms for drapes, gowns, towels, foot covers,  
25 sterilization wraps, and the like. Nonwoven fabric  
laminates have also been incorporated into other  
products such as diapers, feminine hygiene  
products, and the like.

Such nonwoven fabric laminates are typically  
30 made by combining at least one spunbond web with a  
meltblown web. For instance, in one embodiment, a  
meltblown web is positioned between two outer  
layers of spunbond webs. The spunbond webs provide  
durability while the internal meltblown web  
35 provides a barrier layer which is porous but which  
inhibits the strikethrough of fluids or the  
penetration of bacteria from the outside of the

fabric laminate to the inside.

Particular examples of nonwoven laminates as described above are disclosed in U.S. Patent No. 4,041,203 to Brock et al., U.S. Patent No. 4,766,029 to Brock et al., U.S. Patent No. 5,464,688 to Timmons et al., and U.S. Patent No. 5,607,798 to Kobyliyker et al., which are all incorporated herein by reference in their entireties.

Currently, meltblown nonwoven webs used in the above-described laminates are made from a polypropylene resin having an initial melt flow ranging from about 400 g/10 min. to about 800 g/10 min. As used herein, melt flow refers to a measure of the viscosity of the polymer and is expressed as the weight of material that flows from a capillary of known dimensions under a specified load or shear rate for a measured period of time and is measured in g/10 min. according to, for example, ASTM test 1238. The starting polymer is synthesized according to the Ziegler-Natta method in which propylene is polymerized with a catalyst that includes a transition metal salt and a metal alkyl. Polymers made according to this method typically have a broad molecular weight distribution and a relatively low melt flow, which can create problems when forming the polymer into a meltblown web.

In order to reduce the molecular weight distribution of the polymer and in order to increase the melt flow, the polypropylene is then coated with from about 500 ppm to about 750 ppm of peroxide. When the polymer is added to the extruder and melted, the peroxide reacts with the polymer to produce a final melt flow of between about 1200 g/10 min. to about 1800 g/10 min. Adding peroxide has greatly improved the process of meltblowing the polymer into a web.

The peroxide reaction, however, can create variability in the system based on the quality of the dispersion of the peroxide on the polymer. This variability in the resin can result in basis weight uniformity problems and fiber size differences. Thus, a need still remains for a process that will produce a more uniform meltblown product. In particular a need exists for a polymer to be used in a meltblown process that is uniform in melt flow and that has a very narrow molecular weight distribution range.

#### Summary of the Invention

The present invention recognizes and addresses the foregoing disadvantages, and others of prior art constructions and methods.

Accordingly, it is an object of the present invention to provide an improved nonwoven meltblown web.

Another object of the present invention is to provide an improved process for producing a meltblown web.

It is another object of the present invention to provide a meltblown web that is made from a metallocene catalyzed polymer.

Another object of the present invention is to provide an improved laminate containing a nonwoven meltblown web made from a metallocene catalyzed polymer.

Still another object of the present invention is to provide a process for making a meltblown web using a metallocene catalyzed polymer that has a melt flow of less than 1000 g/10 min. and that has a relatively low molecular weight distribution.

It is another object of the present invention to provide a method for producing various fabric laminates such as wipers, garments, medical drapes, diapers, feminine hygiene products, and the like

that incorporate a nonwoven meltblown web made from a metallocene catalyzed polymer.

5           These and other objects of the present invention are achieved by providing a process for forming a nonwoven web from a meltblown polymer. The process includes the steps of extruding a metallocene catalyzed polymer into filaments. The metallocene catalyzed polymer has a melt flow of less than 1000 g/10 min., particularly from about  
10       650 g/10 min. to about 850 g/10 min., and in one preferred embodiment has a melt flow of about 700 g/10 min.

          Once formed, the filaments are contacted with a gas stream, such as hot air at a high velocity.  
15       The gas stream breaks the filaments into fibers. The fibers are then spread onto a forming surface where they form a nonwoven web.

          Preferably, the metallocene catalyzed polymer used in the process of the present invention has a  
20       molecular weight distribution of less than 3.0, particularly less than 2.5, and in one embodiment, less than 2.1. As used herein, the molecular weight distribution of a polymer (or polydispersity index) is determined by dividing the weight average  
25       molecular weight of a polymer by its number average molecular weight. Thus, a polymer with a low molecular weight distribution contains a narrow range of molecular weights. Conversely, a polymer that has high fluctuations in molecular weight will  
30       have a higher molecular weight distribution number.

          Metallocene catalyzed polymers that may be used in the process of the present invention to form the nonwoven web include homopolymers and copolymers of polyolefins. In one preferred  
35       embodiment, the metallocene catalyzed polymer is polypropylene or is a copolymer of polypropylene.

          As described above, the meltblown filaments

are attenuated and broken into fibers by a gas. The fibers that are produced typically have an average diameter of from about 0.5 microns to about 50 microns, and particularly from about 0.5 microns to about 10 microns. In one embodiment, the fibers have an average diameter of from about 1 micron to about 3 microns.

The basis weight of nonwoven webs made according to the present invention can vary and will generally depend upon the particular application for which the webs are used. For most applications, the web will have a basis weight of from about 0.35 oz/yd<sup>2</sup> to about 0.6 oz/yd<sup>2</sup>.

Meltblown nonwoven webs made according to the above described process have many uses and applications. For instance, in one embodiment, the meltblown web can be incorporated into a laminate. The laminate can include the meltblown web adhered to at least one spunbond web. For example, the meltblown web of the present invention can be positioned between a first outer spunbond web and a second outer spunbond web.

Laminates made according to the present invention can be incorporated into various products including wipers, towels, industrial garments, medical garments, medical drapes, diapers, feminine hygiene products, tents, car covers, as well as many other various products.

Other objects, features and aspects of the present invention are discussed in greater detail below.

#### Brief Description of the Drawing

A full and enabling disclosure of the present invention, including the best known thereof, to one of ordinary skill in the art, is set forth more particularly in the remainder of the specification, including reference to the accompanying figure,

which represents a cross-sectional view of one embodiment of a laminate made in accordance with the present invention.

**Detailed Description of the Preferred Embodiments**

5           It is to be understood by one of ordinary skill in the art that the present discussion is a description of exemplary embodiments only, and is not intended as limiting the broader aspects of the present invention, which broader aspects are  
10           embodied in the exemplary construction.

          In general, the present invention is directed to an improved nonwoven meltblown web and to a process for making the web. The meltblown webs are particularly well suited for use in laminates that  
15           are used to make such products as garments, wipers, diapers, feminine hygiene products, and the like. In comparison to webs made according to prior art processes, the meltblown webs of the present invention have improved barrier properties at  
20           equivalent basis weights. In other words, the nonwoven webs of the present invention are more liquid impermeable than prior art constructions.

          As will be discussed hereinafter, the nonwoven meltblown webs of the present invention also have  
25           greater fiber size uniformity and better basis weight uniformity. Further, the webs have reduced shot levels and contain less defects.

          In general, the above described improvements and advantages are achieved by constructing the  
30           meltblown web with a polymer that has a uniform melt flow index and that has a uniform molecular weight. In particular, according to the present invention, meltblown nonwoven webs are formed from a metallocene catalyzed thermoplastic resin, such  
35           as a metallocene catalyzed polypropylene.

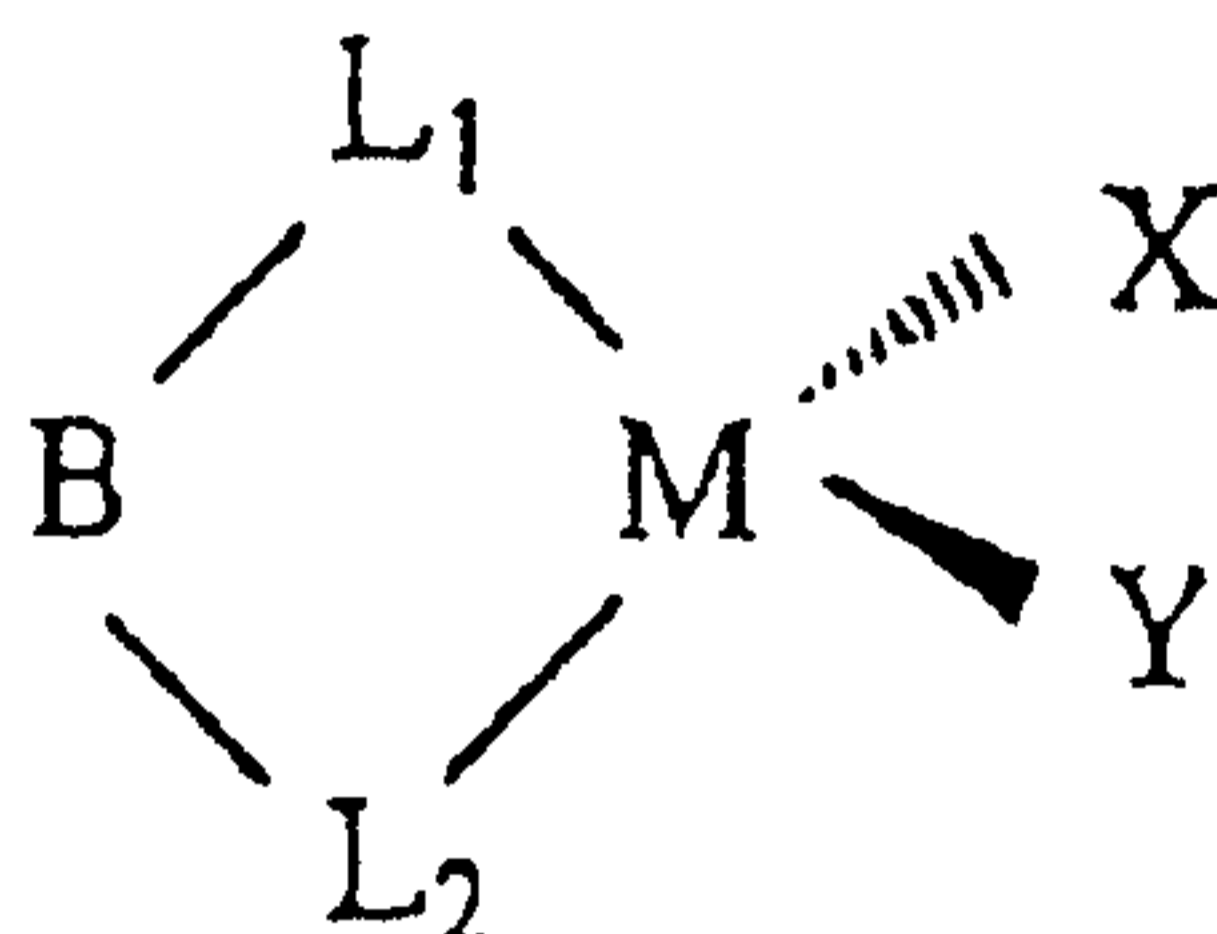
          In order to form the nonwoven webs, the metallocene catalyzed polymer is fed to a meltblow

process. In general, the process of forming a nonwoven web through meltblowing involves extruding a molten polymeric material, such as a thermoplastic resin, through a die which forms filaments. As the filaments exit the die, high pressure fluid, such as heated air or steam, attenuates and breaks the filaments into discontinuous fibers of small diameter. The fibers are randomly deposited on a foraminous screen, drum or on a layer of material to form a web. The web possesses integrity due to entanglement of the individual fibers in the web as well as some degree of thermal or self-bonding between the fibers, particularly when collection is effected only a short distance after extrusion.

In general, the fibers that are produced during the melt blowing process and that are used to form the nonwoven web have an average diameter of from about 0.5 microns to about 50 microns. More particularly, for most applications, the fibers have an average diameter of from about 0.5 microns to about 10 microns. For instance, in one preferred embodiment, the fibers have an average diameter of from about 1 micron to about 3 microns.

The basis weight of nonwoven webs made according to the process of the present invention will vary depending upon the particular application. When incorporated into a fabric laminate, the meltblown web can have a basis weight of from about 0.35 oz/yd<sup>2</sup> to about 0.60 oz/yd<sup>2</sup>. More particularly, for most applications the basis weight of the web will be about 0.50 oz/yd<sup>2</sup>. It should be appreciated, however, that for other applications, the basis weight of the web can be much greater. For instance, in other embodiments, the basis weight can be as high as 10 oz/yd<sup>2</sup> and even higher.

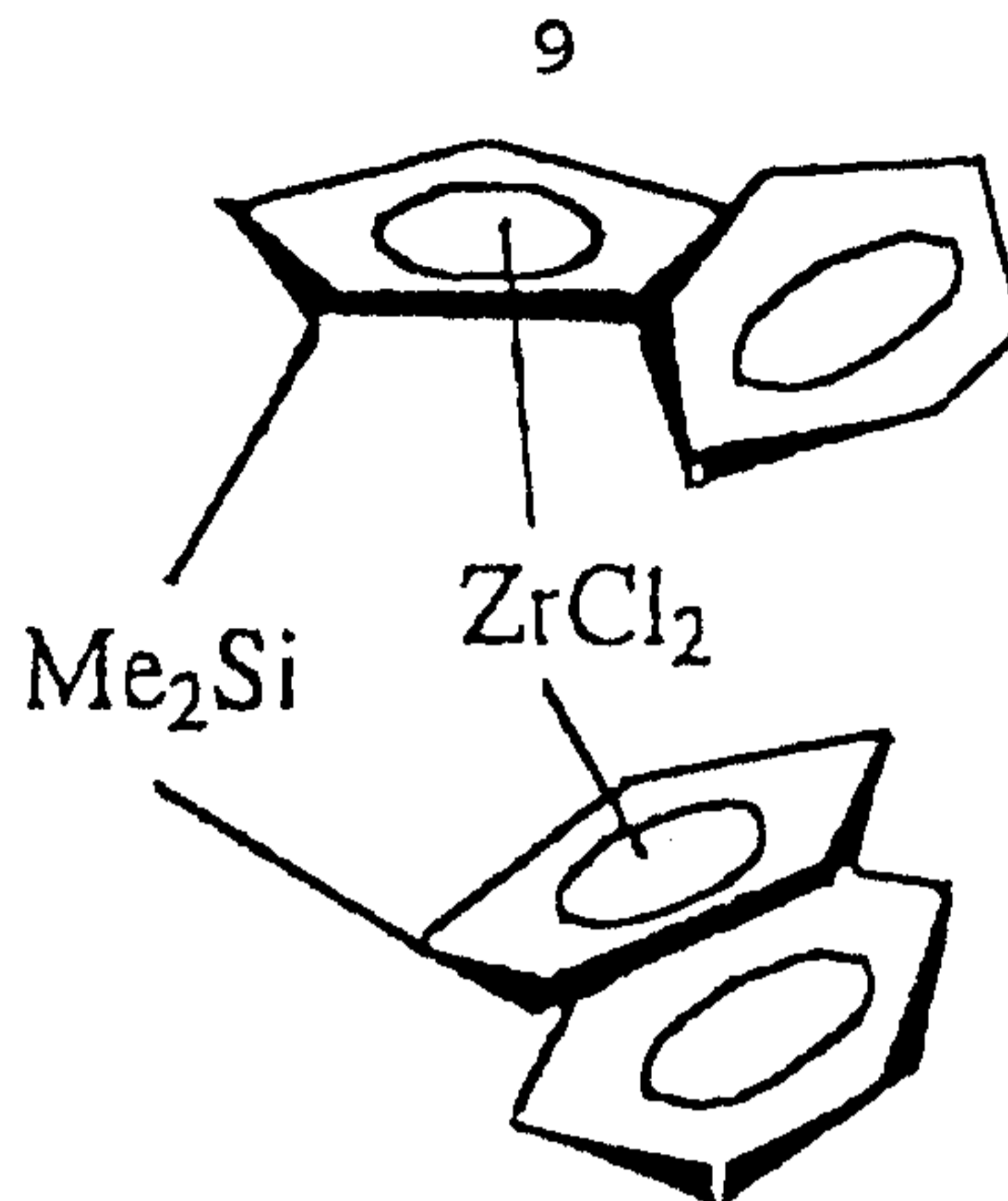
As described above, the present invention is directed to the use of metallocene catalyzed thermoplastic polymers. As used herein, a metallocene catalysis refers to a metal derivative of cyclopentadiene and can be described as a homogeneous single site or constrained geometry catalysis. A metallocene is a neutral, ancillary ligand stabilized transition metal complex and can have the following general formula:



wherein:

- L<sub>1</sub> is a cyclopentadienyl or substituted cyclopentadienyl moiety bonded to the metal through η-5 bonding
- L<sub>2</sub> is an organic moiety, which may or may not be a cyclopentadienyl moiety, strongly bonded to the metal which remains bonded to the metal during polymerization
- B is an optional bridging group that restricts the movement of L<sub>1</sub> and L<sub>2</sub> and that modifies the angle between L<sub>1</sub> and L<sub>2</sub>
- M is a metal such as, for instance, titanium or zirconium
- X and Y are halides or other organic moieties, such as methyl groups

For instance, in one embodiment, metallocene can be as follows:



5

10            Metalocene is a catalyst that initiates  
polymerization of a monomer to form a polymer. For  
instance, in order to form a metallocene catalyzed  
polymer, a liquid monomer, such as propylene, is  
combined with metallocene under constant agitation  
and heat. Controlled amounts of hydrogen gas are  
15 then fed to the mixture causing the polymer to  
form. In general, the amount of hydrogen gas fed  
to the reactor determines the melt flow of the  
resulting polymer.

20            According to the present invention, the  
metallocene catalyzed polymer used to form the  
meltblown web should have a melt flow of from about  
500 g/10 min. to about 1,000 g/10 min., and  
particularly from about 650 g/10 min. to about 850  
g/10 min. For instance, in one preferred  
25 embodiment of the present invention, a  
polypropylene metallocene catalyzed polymer is used  
that has a melt flow of about 700 g/10 min.

30            It has been discovered that various benefits  
and advantages are achieved by using metallocene  
catalyzed polymers having a melt flow within the  
above-described range, which is an unexpected  
result in view of prior art teachings. In  
particular, in the past, in order to improve the  
characteristics of a meltblown web, the melt flow  
35 of the polymer used to make the web was increased.  
The present inventors have discovered that  
increasing the melt flow of metallocene catalyzed

polymers to conventional levels, on the other hand, does not provide similar advantages.

For instance, problems were encountered in forming meltblown webs from metallocene catalyzed polymers having a melt flow of greater than 1,500 g/10 min. As described above, melt flow is a measure of the viscosity of the polymer and relates to the molecular weight of the polymer. It was discovered that metallocene catalyzed polymers having a high melt flow (which have a low molecular weight) have poor melt elasticity characteristics for use in a meltblown process. In particular, filaments produced from these polymers tended to break and form shot, which are imperfections contained within the web. Unexpectedly and against conventional teachings, it was then discovered that lower melt flow metallocene catalyzed polymers actually produce more uniform nonwoven webs with less defects.

Besides melt flow, another important characteristic of the metallocene catalyzed polymers used in the process of the present invention is molecular weight distribution. It has been discovered that metallocene catalyzed polymers have uniform molecular weights and thus a narrow molecular weight distribution range. Because the polymer chains are all of about the same length without great fluctuations, metallocene catalyzed polymers have greater capabilities of producing more uniform fibers and thus, more uniform nonwoven webs when used in meltblown processes. It has also been discovered that by having a low molecular weight distribution in combination with a particular melt flow, the polymer produces nonwoven webs with less defects.

In particular, metallocene catalyzed polymers used in the present invention should have a

molecular weight distribution of less than 3.0, and particularly less than 2.5. For instance, in one embodiment, the polymer has a molecular weight distribution of from about 1.9 to about 2.1.

5           The thermoplastic polymer that is synthesized using the metallocene catalyst for use in the present invention is preferably a homopolymer or a copolymer of a polyolefin. For example, in one preferred embodiment, the polymer is polypropylene  
10 or a copolymer of polypropylene. An example of a copolymer, for instance, is a polypropylene-polyethylene random copolymer.

          When using a metallocene catalyzed thermoplastic polymer in accordance with the  
15 present invention to form a meltblown web, it has been discovered that preferably the polymer, when being meltblown, is heated to a temperature of less than about 450°F, and particularly from about 350°F to about 425°F. More uniform webs are produced  
20 when the processing temperature of the polymer is less than 450°F. At higher temperatures, fluid permeability levels of the formed web may begin to decrease.

          One commercially available polymer that has  
25 been found particularly well suited for use in the present invention is a metallocene catalyzed polypropylene marketed by the Exxon Corporation. This polymer resin has a melt flow of about 700 g/10 min. and a molecular weight distribution of  
30 from about 1.9 to about 2.1.

          The meltblown webs made according to the present invention can be used in a wide variety of applications. For instance, the meltblown webs can be combined with other webs of material to form a  
35 laminate. In one embodiment, for example, the meltblown web of the present invention can be combined with one or more spunbond webs to form a

laminates having many commercial applications.

One example of such a laminate generally 10 is illustrated in the Figure. As shown, laminate 10 includes a nonwoven meltblown web 12 made in accordance with the present invention spaced between a first outer spunbond web 14 and a second outer spunbond web 16. In this embodiment, meltblown web 12 acts as a barrier layer between spunbond layers 14 and 16.

As used herein, a spunbond web refers to a web made from continuous filaments. The process for producing spunbond webs includes continuously extruding a polymer through a spinnerette 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. The continuous filaments are then deposited in a substantially random manner onto a carrier belt or forming surface to form a web.

A multi-layer laminate as illustrated in the Figure may be formed by a number of different techniques including but not limited to using adhesives, needle punching, ultrasonic bonding, thermal calendering and any other method known in the art. In one embodiment, such a laminate may be made by sequentially depositing onto a moving conveyor belt or forming wire first a spunbond fabric layer, then a meltblown fabric layer, and, if applicable, another spunbond layer. Once the different layers have been assembled, the layers can be bonded together as described above. Alternatively, the fabric layers may be made individually, collected in rolls, and combined in a separate bonding step.

Laminates as illustrated in the Figure are useful for a wide variety of applications. For

example, such laminates can be incorporated into wipers, towels, industrial garments, medical garments, medical drapes, medical gowns, foot covers, sterilization wraps, diapers, feminine hygiene products, besides various other products.

The present invention may be better understood with reference to the following example.

**EXAMPLE**

The following example was conducted in order to demonstrate that meltblown webs made according to the process of the present invention have better uniformity and are more impermeable to fluids than webs made according to prior art methods. The following test was also performed in order to determine the effects of varying the polymer processing temperature when forming webs of the present invention.

Polypropylene resins synthesized according to the Ziegler-Natta method and reacted with peroxide as described above were meltblown into nonwoven webs and compared with webs formed according to the present invention using a metallocene catalyzed polypropylene having a melt flow of 700 g/10 min. The polypropylene resins made according to the Ziegler-Natta method had varying melt flows. The Ziegler-Natta catalyzed polymers were all meltblown into filaments at a temperature of 470°F. The polymer processing temperature of the metallocene catalyzed polymers, however, was varied.

Three different meltblown webs were constructed from polymers made according to the Ziegler-Natta method, while four different webs were constructed from the metallocene catalyzed polymer. All of the webs had a basis weight of from about 0.42 oz/yd<sup>2</sup> to about 0.49 oz/yd<sup>2</sup>.

Once formed, each of the webs was then subjected to a hydrostatic test in order to

determine the permeability of the webs to liquids. In particular, a sample of each of the webs was placed in contact with a stream of water. The pressure of the water against the web was then  
5 increased until the water penetrated and flowed through the web. The pressure of the water was recorded once three droplets of water were observed on the side of the web opposite the fluid stream. The following results were obtained:

Table 1: Fluid Permeability Comparisons Between Polypropylene Meltblown Webs Made Using Ziegler-Natta Catalyzed Polymers and Metallocene Catalyzed Polymers

SAMPLE NO.	MELTFLOW (g/10 min.)	BASIS WEIGHT (oz/yd <sup>2</sup> )	POLYMER PROCESSING TEMP. (°F)	HYDROSTATIC HEAD (mbar)
1 (Ziegler-Natta)	1200	0.4536	470	44.15
2 (Ziegler-Natta)	1400	0.4265	470	45.95
3 (Ziegler-Natta)	1600	0.4494	470	44.00
4 (Metallocene)	700	0.4936	380	49.60
5 (Metallocene)	700	0.4624	400	51.45
6 (Metallocene)	700	0.4641	425	54.27
7 (Metallocene)	700	0.4653	450	37.30

As shown above, except for the metallocene catalyzed polymer processed at 450°F, the webs made from the metallocene catalyzed polypropylene were more impermeable to the fluid than the webs made from the Ziegler-Natta catalyzed polymers at approximately the same basis weights. As also shown, when forming a meltblown web from a metallocene catalyzed polymer, better permeability results are obtained when the polymer is processed at a temperature of less than 450°F. Thus, metallocene catalyzed polymers are preferably processed at temperatures lower than polymers used in the past, which provides an additional advantage when using the polymers of the present invention.

These and other modifications and variations to the present invention may be practiced by those of ordinary skill in the art, without departing from the spirit and scope of the present invention, which is more particularly set forth in the appended claims. In addition, it should be understood that aspects of the various embodiments may be interchanged both in whole or in part. Furthermore, those of ordinary skill in the art will appreciate that the foregoing description is by way of example only, and is not intended to limit the invention so further described in such appended claims.

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WHAT IS CLAIMED IS:

1. A process for forming a nonwoven web from a meltblown polymer comprising the steps of:

extruding a metallocene catalyzed thermoplastic polymer into filaments, said metallocene catalyzed polymer comprising a polypropylene homopolymer or a metallocene catalyzed copolymer containing primarily propylene, said metallocene catalyzed polymer having a melt flow of from about 500 g/10 min. to less than 800 g/10 min.;

contacting said filaments with a gas stream, said gas stream breaking said filaments into fibers; and

forming said fibers into a nonwoven web.

2. A process as defined in claim 1, wherein said metallocene catalyzed polymer has a melt flow of from about 650 g/10 min. to about 700 g/10 min.

3. A process as defined in claim 1, wherein said metallocene catalyzed polymer has a melt flow of about 700 g/10 min.

4. A process as defined in claim 1, wherein said metallocene catalyzed polymer has a molecular weight distribution of less than 3.0.

5. A process as defined in claim 1, wherein said metallocene catalyzed polymer has a molecular weight distribution of less than about 2.1.

8. A process as defined in claim 1, wherein said nonwoven web has a basis weight of from about 0.35 oz/yd<sup>2</sup> to about 0.6 oz/yd<sup>2</sup>.

9. A process as defined in claim 1, wherein said fibers formed into said nonwoven web have an average diameter of from about 0.5 microns to about

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10 microns.

10. A process as defined in claim 1, wherein said metallocene catalyzed thermoplastic polymer is extruded at a temperature less than 450°F.

5 11. A laminate comprising at least one spunbond web adhered to a meltblown nonwoven web, said meltblown web being made from a metallocene catalyzed thermoplastic polymer having a melt flow of from about 500 g/10 min. to less than 800 g/10 min, said metallocene catalyzed polymer comprising  
10 a polypropylene homopolymer or a metallocene catalyzed copolymer containing primarily propylene.

12. (Amended) A laminate as defined in claim 11, wherein said metallocene catalyzed thermoplastic polymer has a melt flow of from about  
15 650 g/10 min. to about 700 g/10 min.

14. A laminate as defined in claim 12, wherein said metallocene catalyzed thermoplastic polymer has a molecular weight distribution of less than 3.0.

15. A laminate as defined in claim 14, wherein said metallocene catalyzed thermoplastic polymer has a molecular weight distribution of less than about 2.1.

16. A laminate as defined in claim 11, wherein said meltblown nonwoven web has a basis weight of from about 0.35 oz/yd<sup>2</sup> to about 0.6 oz/yd<sup>2</sup>.

5 17. A laminate as defined in claim 11, wherein said laminate includes a first outer spunbond web and a second outer spunbond web, said meltblown nonwoven web being located between said first outer spunbond web and said second outer

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10 spunbond web.

18. A laminate as defined in claim 11, wherein said laminate comprises a garment.

19. A laminate as defined in claim 11, wherein said laminate comprises a wiper product.

20. A laminate as defined in claim 11, wherein said laminate comprises a diaper or a feminine hygiene product.

5 21. (Amended) A nonwoven web comprising fibers made from a meltblown polymer, said meltblown polymer comprising a metallocene catalyzed polypropylene homopolymer or a metallocene catalyzed copolymer containing primarily propylene, said metallocene catalyzed  
10 polypropylene having a melt flow of from about 650 g/10 min. to less than 800 g/10 min. and a molecular weight distribution of less than about 3.0.

22. A nonwoven web as defined in claim 21, wherein said metallocene catalyzed polypropylene has a molecular weight distribution of less than about 2.5.

23. A nonwoven web as defined in claim 21, wherein said web has a basis weight of from about 0.35 oz/yd<sup>2</sup> to about 0.6 oz/yd<sup>2</sup>.

24. A nonwoven web as defined in claim 21, wherein said fibers have an average diameter of from about 0.5 microns to about 10 microns.

25. A nonwoven web as defined in claim 21, wherein said metallocene catalyzed polypropylene comprises a copolymer.

26. A nonwoven web as defined in claim 21, wherein said metallocene catalyzed polypropylene is

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meltblow into said fibers at a temperature of from  
about 350°F to about 425°F. -

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