CONVENTION

AUSTRALIA

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REQUEST FOR A STANDARD PATENT

AND NOTICE OF ENTITLEMENT

The Applicant identified below requests the grant of a patent to the nominated person identified below for an invention described in the accompanying standard complete patent specification.

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[54]Invention Title:

A PLASTICS MATERIAL

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[31,33,32]

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Applicant states the following:

1. The nominated person is the assignee of the actual inventor~~(s)~~

2. The nominated person is
   - the applicant
   - ~~the assignee of the applicant~~
   - ~~authorised to make this application by the applicant~~

   of the basic application.

3. The basic application(s) ~~was~~/were the first made in a convention country in respect of the invention.

The nominated person is not an opponent or eligible person described in Section 33-36 of the Act.

5 May 1992

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Patent Attorneys
By

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(56) Prior Art Documents
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(57) Claim

1. A method of making a plastics material having at least first and second layers of plastics polymeric materials bonded together characterised in, selecting the material of said first layer to have a melting point which is lower than the melting point of the material of said second layer, orientating said layers and heating said layers to a temperature at least that of the melting point of the said first layer but below that of said second layer, said orientating and heating being carried out sequentially or simultaneously, the temperature and orientation being sufficient to break up said first layer to form an irregular surface pattern and provide said plastics material with a soft feel and low or minimal noise.

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COMPLETE SPECIFICATION
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Invention Title:

A PLASTICS MATERIAL

Our Ref : 287730
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The following statement is a full description of this invention, including the best method of performing it known to applicant(s):

6006

In WO89/10836 (US Patent 4,855,187), an oriented multi-layer film consists of a high density polyethylene layer combinea with a polypropylene layer with the film being oriented by stretching it at a temperature above the melting point of the high density polyethylene but below the melting point of the polyproylene so as to provide a low co-efficient of friction and good optical properties of haze and gloss. The bi-axial stretching is effected to increase the strength and enhance the properties such as haze and gloss. There is no disclosure of breaking a layer to create an irregular surface pattern to provide a film with a soft feel and low or minimal noise.

In German patent specification 1161679, the problem of crumpling at the point of a weld is overcome by a two layer film composed of materials of different melting points being coated with a material while molten whose melting point is considerably lower than that of the two layer film. The coated film is then stretched either mono or bi-axially at a temperature only a few degrees below the higher melting point of the two films in the initial film. The stretched, coated film can now be sealed to itself at a temperature somewhere in between the lowest and highest melting points of the materials involved. The strength bearing film with the higher melting point remains below its melting temperature during the welding process and therefore the entire film does not crumple. There is no disclosure in this specification of the lower melting point film being broken up to form an irregular surface which will provide in a resultant film, a soft feel and low or minimal noise as in the present invention. Instead, the lower melting point film must, after being in the molten state, remain as an integral film in order that two sides of that film can be joined together to produce the required welded bond.

These prior art techniques all suffer from various disadvantages in respect of the degree to which the desired properties are achieved or the time or complexity in making such films.

When such films are used for products such as disposable diapers, it has been found that the adhesion of the diaper tapes can be inadequate.

Also, such plastics films are generally not very receptive to being written on.

Al.. with the use of fillers or embossing it has been found that this tends to reduce the tensile strength of the film so as to require the use of a relatively thick film.

It is an object of the present invention in its various embodiments to provide a plastics material and/or a method of making same which will avoid or obviate disadvantages in the prior art films or methods of making same to the present time or which at least will provide the public with a useful alternative.

Further objects of the invention will become apparent from the following description.

BRIEF SUMMARY OF THE PRESENT INVENTION

According to one aspect of the present invention there is provided a plastics material comprising at least first and second layers of plastics polymeric materials which are bonded together wherein the melting point of the material of said first layer is lower than the melting point of the material of said second layer and said first layer is broken up to form an irregular surface pattern, providing said plastics material with a soft feel and low or minimal noise, by the orientation of said layers and by the heating of said layers to at least the lower melting point but below the higher melting point, said orientation and said heating being carried out sequentially or simultaneously.

According to a further aspect of the present invention there is provided a method of making a plastics material having at least first and second layers of plastics polymeric materials bonded together characterised in, selecting the material of said first layer to have a melting point which is lower than the melting point of the material of said second layer, orientating said layers and heating said layers to a temperature at least that of the melting point of the said first layer but below that of said second layer, said orientating and heating being carried out sequentially or simultaneously, the temperature and orientation being sufficient to break up said first layer to form an irregular surface pattern and to provide said plastics material with a soft feel and low or minimal noise.

According to a still further aspect of the present invention there is provided a method of making a plastics material as defined in the paragraph immediately above wherein said layers are orientated at a temperature lower than the melting point of said first layer and said layers are then heated to a temperature at least that of the melting point of said first layer whereby said first layer breaks up to form said irregular surface pattern.

According to a still further aspect of the present invention there is provided a plastics material made by the method as defined in either of the two paragraphs immediately above.

According to a still further aspect of the present invention there is provided a sanitary or writing receptive product formed from a plastics material which, or the method of making which, is defined in the immediately preceding paragraphs.

Further aspects of this invention which should be considered in all its novel aspects will become apparent from the following description, which is given by way of example only of possible embodiments.

BRIEF DESCRIPTION OF THE ILLUSTRATIONS

Referring now to the accompanying illustrations wherein:

FIGURE 1: Shows a plastics film according to example 1 of one possible embodiment of the invention and magnified one thousand times;

FIGURE 2: Shows the plastics film of example 1 magnified one hundred and seventy times;

FIGURE 3: Shows Example 1 of the preceding figures magnified by 850 times with the view on an angle on the side near the edge of the film;

FIGURE 4: Shows a plastics film according to Example 2 according to a further embodiment of the invention and magnified by 150 times;

FIGURE 5: Shows Example 2 of the preceding figure magnified by 1,000 times; and

FIGURE 6: Shows the film of Example 2 magnified by 1000 times but before its orientation.

FIGURE 7: Shows Example 3A according to a further embodiment of the invention magnified by 150 times.

FIGURE 8: Shows Example 3A of the preceding figure magnified 1500 times.

FIGURE 9: Shows Example 3B according to a further embodiment of the invention magnified by 150 times.

FIGURE 10: Shows Example 3B of the preceding figure magnified 1500 times.

FIGURES 11 AND 12: Show Example 4 magnified by 150 and 1500 times respectively.

FIGURES 13 AND 14: Show Example 5 magnified by 150 and 1500 times respectively.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS OF THE PRESENT INVENTION

The various embodiments of the invention described below include a multi-layer film having at least two layers but possibly 14 or more layers, the properties of the material of the respective layers being selected so that preferably after co-extrusion, the orientation and heating results in the desired film.

Taking the basic film consisting of a pair of layers, the first layer is required to have a melting point which is lower than the second layer. Typically the first layer would be selected from a polyolefin with a low melting point and a low melt index. Examples of polyolefins suitable for this purpose would be ethylene vinyl acetate co-polymers (EVA) and filled polyethylenes, low density polyethylene, ethylene butyl acrylate co-polymer and ethylene methacrylic acid co-polymer. Many other co-polymers or terpolymers of ethylene would also be suitable.

The second layer is required to have a higher melting point and suitably is selected from a polyolefin readily orientated close to the melting point of the first layer. Suitable polyolefins would be selected from the group of high density polyethylene, polypropylene, polybutylene, linear low density polyethlene or ultra low linear low density polyethylene (ULLLDPE).

One possible structure would be A/B/A where:

A = EVA

B = ULLLDPE

A further structure could be A/B/C/B/C or A/C/B/C/A where, A and B are as above described and:

C = Modified polyethylene.

Further structures would be A/B, A/B/A, A/B/A/B/A, A/B/C/B/C, A/C/B/C/A, or A/B/C/B/C/B/A where A is the first layer and consists of a co-polymer or terpolymer of ethylene and where B and C, when used, are a polyolefin, polyamide, polybutylene or polyvinyl alcohol.

One or more of the layers may incorporate additional materials such as MASTERBATCH (T.M.), anti-block, anti-slip or colouring. Also, a water absorbent material may be incorporated in one or more layers with advantage in sanitary products such as diapers, incontinence pants, sanitary napkins, and the like.

In producing the film according to a preferred embodiment of the invention, the multiple layer film is suitably co-extruded and may then be orientated, which could be monoaxially or biaxially, at a temperature approximating that of the melting point of the first layer i.e. the lower melting point. The orientating ratio may be at least 2 times and possibly as high as 7 times but 3 to 5 times may be preferable.

It has been found that the resultant film has the required cloth-like properties and may have a thickness between 8um - 200μm. Figures 1 to 5 and 7 to 10 show examples of films which have been made by the present invention. When magnified, the first outer layer is shown to have an irregular, broken up, surface created over at least the second layer resulting in a film with cloth-like properties, a matt appearance and low or minimal noise. The broken up first layer is seen to form a cratered appearance of flattened peaks and pits or troughs. This surface in conjunction with the materials used for the layers results in the film with the required characteristics. The "cratering" has been found to be beneficial in facilitating the gripping of tape, for example, to it.

Figure 6 shows the surface of the film of figures 4 and 5 before orientation.

In the description hereinafter the term "blocking" or "blocked" refers to the known technique of fusing two or more layers of material to form a single layer.

EXAMPLE 1

A five layer film structure was produced by blocking a three layer co-extrusion produced on a 150 mm ϕ blown film die. The inside and outside layers are each fed by a single screw 45mm ϕ extruder and the middle layer is fed by a single screw 30mm ϕ extruder.

FINAL FILM STRUCTURE

Final film Structure is as follows:

Layer 1	(13.5 μm)	EVA
2	(15.7 μm)	Polybutylene
3	(13.5 μm)	EVA
4	(13.5 μm)	EVA
5	(15.7 μm)	Polybutylene
6	(13.5 μm)	EVA

(Layers No. 3 and 4 are blocked to provide a five layer structure).

Each extruder feeds the die with 6.7 kg/hr of melt, giving a total output of 20.1 kg/hr.

The bubble is drawn off by the nips at 8.8m/min

The EVA used in this particular example was Du Pont Elvax (R) 3135 as extrudable ethylene vinyl acetate copolymer resin having a melt temperature of 92°C.

Melt Index = 0.25 g/10 min

Density = 0.94 g/cc

Copolymer % = 12%

The polybutylene used was Mitsui (R) M3110 having a melt temperature of 112°C.

The extruded blocked tube was then monoaxially orientated by passing through a preheating roller 1, then through a series of nine equally sized rollers each stationed vertically above the next, followed by a cooling roller 11. The speed and temperature of each roller is controllable to allow orientation at precise temperature.

An orientated film was produced using the following conditions:

Roller No.	Speed m/min	Temperature (°C)
1	1.1	70
2	1.1	90
3	1.1	90
4	1.5	95
5	1.5	95
6	3.0	100
7	3.1	100

8	3.1	100
9	3.1	100
10	3.0	100
11	3.0	25

The film produced was then analysed (refer Laboratory Report)

LABORATORY REPORT

Example 1.

	Before Orientation	After Orientation
Gauge: (NZS 7651:1976)	86μm	35μm
Yield:	78.2 g/m^2	21.1g/m^2
Tensiles: (ASTM D882)		
UTS:		
MD	61 N/25mm	31 N/25mm
TD	60 N/25mm	18 N/25mm
ELONGATION:		
MD	281%	25%
TD	401%	337%
Tear Resistance: (ASTM D1922)		
MD	571gF	220gF
TD	800gF	120gF

Figures 1 to 3 show actual photographs of the film of Example 1. The EVA providing the outer layers is seen to have broken up to provide an irregular surface pattern over the polybutylene. The film is soft and cloth-like with no noticeable "crinkle".

EXAMPLE 2

Referring now to Figures 4 and 5 of the accompanying drawings, example 2 according to a further embodiment of the invention, which is described in greater detail below, is shown again provided with an irregular pattern creating the desired cloth-like properties. Figure 6 shows the surface of the film before orientation.

A five layer blocked co-extrusion was produced as in Example No. 1.

The Mitsui Polybutylene was replaced with an Ultra Low Linear Low Density Polyethylene (ULLLDPE). Dow Attane (T.M.) 4003 was used having a melting point of 122°C.

Melt Index = 0.8 g/10 min

Density = 0.905 g/cc

FINAL FILM STRUCTURE

Final film structure is as follows:

Layer 1	13.5μm	EVA
2	14.0μm	ULLLDPE
3	13.5μm	EVA
4	13.5μm	EVA
5	14.0μm	ULLLDPE
6	13.5μm	EVA

(Layers 3 and 4 are blocked to produce a five layer structure.)

Each extruder feeds the die with 4.3 kg/hr of melt giving a total die output of 12.9 kg/hr.

The bubble is drawn off by the nips at 5.7 m/min.

The film is monoaxially orientated using the same equipment as Example No. 1 but the following running conditions were used:

Roller No.	Speed m/min	Temperature (°C)
1	1.1	75
2	1.2	87
3	1.2	87
4	1.6	95
5	1.7	95
6	5.1	100
7	5.1	100
8	5.1	100
9	5.1	100
10	5.2	100
11	5.2	25

LABORATORY REPORT

Example 2

	Before Orientation	After Orientation
Gauge: (NZS 7651:1976)		
Average:	82µm	22µm
Yield:	73.2 g/m^2	16.4g/m^2
Tensiles: (ASTM D882)		
UTS:		
MD	44 N/25mm	31 N/25mm
TD	53 N/25mm	7 N/25mm
ELONGATION:		
MD	281%	24%
TD	401%	337%

Tear Resistance: (ASTM D1922)

MD	650gF	349gF
TD	1101gF	168gF

EXAMPLE 3A.

Referring now to Figures 7, 8, 9, and 10 of the accompanying drawings, examples 3A and 3B according to a further embodiment of the invention, which is described in greater detail below, are shown again provided with an irregular pattern creating the desired cloth-like properties.

Effectively a 3-layer film structure was produced by blocking a 5-layer co-extrusion produced on a 300mm ϕ blown film die. The outside, middle and inside layers are each fed by a single screw 60 mm ϕ extruder and the bond layer is fed by a single screw 45mm ϕ extruder.

The Dow Attane (TM) 4003 was replaced with a Dow Attane (TM) 4001. This has a melting point of 122°C.

Melt Index	=	1.0g/10min
Density	=	0.912g/cc

FINAL FILM STRUCTURE

Final Film structure as follows:

Layer	1	5.7μm	EVA
	2	1.9μm	ULLLDPE
	3	16.2μm	ULLLDPE
	4	1.9μm	ULLLDPE
	5	12.4μm	ULLLDPE

6	12.4µm	ULLLDPE
7	1.9µm	ULLLDPE
8	16.2µm	ULLLDPE
9	1.9µm	ULLLDPE
10	5.7µm	EVA

(Layers 2 to 8 are blocked to provide a three layer structure).

Extruders 1, 2, 3 and 4 feed the die with 20.2, 32.7, 10.7 and 6.8 kg/hr of melt respectively, giving a total output of 70.4 kg/hr.

The bubble is drawn off by the nips at 26.8m/min.

The film is monoaxially orientated using the same equipment as Example No. 1 but the following running conditions were used.

Roller No.	Speed (m/min)	Temperature (°C)
1	2.6	55
2	2.7	65
3	2.7	65
4	2.7	80
5	2.7	80
6	3.8	108
7	10.4	108
8	10.4	108
9	10.3	108
10	10.4	108
11	10.4	25

LABORATORY REPORT

EXAMPLE 3A

			After Orientation
Gauge:	(NZS7651:1976)		19μm
Yield:			18.2g/m^2
Tensiles:	(ASTM D882)		
	UTS:	MD	52.4N/25mm
		TD	8.6N/25mm
	ELONGATION		
		MD	65%
		TD	540%
Tear Resistance:	(ASTM D1922)		
		MD	543gF
		TD	370gF

EXAMPLE 3B

The final structure of this film is identical to that of Example 3A.

The film is monoaxially orientated using the same equipment as Example No. 1 but the following running conditions were used:

Roller No.	Speed (m/min)	Temperature (°C)
1	2.6	55
2	2.7	65
3	2.7	65
4	3.6	80
5	10.4	80
6	10.4	108

Roller No.	Speed (m/min)	Temperature (°C)
7	10.4	108
8	10.3	108
9	10.4	108
10	10.4	108
11	10.4	25

It is seen that in contrast to Example 3A, the orientating and the heating is effected sequentially, the orientating being commenced at a low temperature of 80°C and the material is then heated up to the EVA melt temperature. This "cold draw" technique creates a changed surface pattern of the EVA in the final film from that of the "hot draw" technique of Example 3A. It is a less regular surface pattern and is not as desirable, because it can produce a "patchy" appearance. Also cold drawing is less energy efficient as hot drawing is able to make use of the energy released as heat during drawing.

EXAMPLE 4.

A seven layer film structure was produced by blocking two 5 layer films co-extruded on a 300mm ϕ blown film die. The outside, middle and inside layers are each fed by a single screw 60mm ϕ extruder and the bond layer is fed by a single screw 45mm ϕ extruder.

A butene linear low density polyethylene ESCORENE LL1001XF was introduced into the middle layer. This has a melting point of 121.5°C.

Melt Index	1.0g/10 min
Density	.918g/cc

FINAL FILM STRUCTURE

Layer	1	5.7	μm	EVA
	2	1.9	μm	ULLLDPE
	3	22.8	μm	Butene LLDPE
	4	1.9	μm	ULLLDPE
	5	5.7	μm	ULLLDPE
	6	5.7	μm	ULLLDPE
	7	1.9	μm	ULLLDPE
	8	22.8	μm	Butene LLDPE
	9	1.9	μm	ULLLDPE
	10	5.7	μm	EVA

The blocking of the two co-extruded 5 layer films produces a 7 layer structure.

Extruders 1, 2, 3 and 4 feed the die with 9.1, 43.5, 8.2 and 10.1 Kg/hr of melt respectively, giving a total output of 68 Kg/hr.

The bubble is drawn off by the nips at 13.3 m/min.

The film is monoaxially orientated using the same equipment as Example No 1 but the following running conditions were used.

Roller No.	Speed (m/min)	Temperature (°C)
1	2.0	65
2	2.1	75
3	2.1	75
4	2.2	85
5	2.3	85
6	8.0	108

Roller No.	Speed (m/min)	Temperature (°C)
7	8.1	108
8	8.1	108
9	8.1	108
10	8.1	108
11	8.1	25

LABORATORY REPORT

Example 4

		After Orientation
Gauge (NZS 7651:1976)		19μm
Yield		18.3g/m^2
Tensiles: (ASTM D882)		
UTS:	MD	48.7N/25mm
	TD	8.0N/25mm
ELONGATION	MD	71%
	TD	516%
Tear Resistance: (ASTMD1922)		
	MD	224gF
	TD	257gF

EXAMPLE 5

A five layer film structure was produced by co-extrusion on the same 300mm ∅ blown film die as that described in Example No 4.

FINAL FILM STRUCTURE

Layer	1	11.4 µm	EVA
	2	3.8 µm	ULLLDPE
	3	28.5 µm	Butene LLDPE
	4	3.8 µm	ULLLDPE
	5	28.5 µm	Butene LLDPE

Extruders 1, 2, 3 and 4 feed the die with 9.9, 24.3, 24.3 and 6.4 kg/hr of melt respectively, giving a total output of 64.9 kg/hr.

The bubble is drawn off by the nips at 6.8 m/min.

The film is monoaxially orientated using the same equipment as Example No 4 but the following running conditions were used:

Roller No.	Speed (m/min)	Temperature (°C)
1	2.0	65
2	2.1	75
3	2.1	75
4	2.2	85
5	2.3	85
6	8.0	108
7	8.1	108
8	8.1	108
9	8.1	108
10	8.1	108
11	8.1	25

LABORATORY REPORT

Example 5

		After Orientation
Gauge (NZS 7651:1976)		19μm
Yield		18.0g/m²
Tensiles: (ASTM D882)		
UTS:		
	MD	39.9N/25mm
	TD	7.7N/25mm
ELONGATION		
	MD	89%
	TD	488%
Tear Resistance: (ASTMD1922)		
	MD	81gF
	TD	488gF

In Example 3A, a three layer material is described with EVA providing the two outer layers.

It is to be appreciated that only a two layer material may be used so that in Example 3A, EVA could be provided on one side only by way of example. Such a structure may be particularly useful where the quality of appearance of the other layer is not important or is of lesser importance.

The above examples can be treated using well known techniques such as corona discharge.

It is thus seen that by orientation of selected materials and the simultaneous or sequential heating to selected temperatures, a multi-layer plastic material having the desired properties can be achieved making it suitable for use in diapers and other sanitary products.

It has been found however that the broken surface of the material is also very receptive to being written on. The present invention would therefore also be suitable for use for a label, tag, packaging or the like by courier, postal services or any other users requiring a surface to receive writing, printing or the like.

Depending on the intended use of the plastics material, its softness and strength may be of particular importance.

In carrying out the above examples, it has been found that a perceived increased softness may be obtained in an ABA structure, where the layers A are each 7.5% by weight EVA and B is 85% by weight of ULLDPE, as compared to an ABA structure, where A and B are again respectively EVA and ULLDPE but the percentages by weight are 33%/33%/33%.

Also the overall characteristics of the material have been found to be improved with a higher orientation temperature of 108°C rather than 100°C.

This "orientation temperature" is the temperature of the rollers given in the above Examples and not the actual layer temperature.

Also it has been found that drawing at 4X rather than 5X can induce less stiffness into the film and accordingly a softer feel. Generally, the greater the draw, the stiffer and less soft the film becomes. The material could be drawn at 3.5X or even lower.

Accordingly it is necessary to be selective in respect of the materials used, the amount of draw and the temperatures used in achieving a material having the desired characteristics.

In the above examples 3A, 3B, 4 and 5, the values of "Tape Adhesion" for the treated material were as follows:

Example	Tape Adhesion (g)
3A & 3B	690
4	>1500
5	1010

Typical tape adhesion values in existing treated films would be considerably lower perhaps of the order of 300g. The present invention is therefore seen to provide a substantial advantage in respect of tape adhesion.

Where in the foregoing description reference has been made to specific components or integers of the invention having known equivalents then such equivalents are herein incorporated as if individually set forth.

Although this invention has been described by way of example and with reference to possible embodiments thereof it is to be understood that modifications or improvements may be made thereto without departing from the scope of the invention as defined in the appended claims.

THE CLAIMS DEFINING THE INVENTION ARE AS FOLLOWS:-

1. A method of making a plastics material having at least first and second layers of plastics polymeric materials bonded together characterised in, selecting the material of said first layer to have a melting point which is lower than the melting point of the material of said second layer, orientating said layers and heating said layers to a temperature at least that of the melting point of the said first layer but below that of said second layer, said orientating and heating being carried out sequentially or simultaneously, the temperature and orientation being sufficient to break up said first layer to form an irregular surface pattern and provide said plastics material with a soft feel and low or minimal noise..

2. A method of making a plastics material as claimed in Claim 1, characterised in orientating the said layers at a temperature lower than the melting point of said first layer and then heating said layers to a temperature at least that of the melting point of said first layer.

3. A method of making a plastics material as claimed in Claim 1 characterised in orientating and heating the said layers simultaneously.

4. A method of making a plastics material as claimed in Claim 1 characterised in using a structure AB, ABA, ABABA, ABCBC, ACBCA or ABCBCBA where A is said first layer and consists of a co-polymer or terpolymer of ethylene and where B and C, when used, are a polyolefin, polyamide, polybutylene or polyvinyl alcohol.

5. A method of making a plastics material as claimed in Claim 1 characterised in any one of the Examples 1, 2 3A, 3B, 4 and 5.

6. A plastics material characterised in that it is produced by the method of any one of Claims 1 to 5.

7. A plastics material including at least first and second layers of plastics polymeric materials which are bonded together wherein the melting point of the material of said first layer is lower than the melting point of the material of said second layer and said first layer is broken up to form an irregular surface pattern, providing said plastics material with a soft feel and low or minimal noise, by the orientation of said layers and by the heating of said layers to at least the lower melting point but below the higher melting point, said orientation and said heating being carried out sequentially or simultaneously.

8. A plastics material as claimed in claim 7 and having five layers ABABA characterised in that layers A are of ethylene vinyl acetate co-polymer and layers B are any one of polybutylene, polypropylene, high density polyethylene, linear low density polyethylene and ultra low linear low density polyethylene.

9. A plastics material as claimed in claim 7 having a structure AB or ABA characterised in that layer(s) A is/are of ethylene vinyl acetate co-polymer and layer B is of an ultra low linear low density polyethylene.

10. A plastics material as claimed in claim 7 having

seven layers ABCBCBA characterised in that layers A are of polyethylene vinyl acetate co-polymer, layers B are of an ultra low linear low density polyethylene and layers C are of a modified polyethylene.

11. A plastics material as claimed in claim 7 having five layers ABCBC or ACBCA characterised in that layer A is of ethylene vinyl acetate co-polymer, layers B are of an ultra low linear low density polyethylene and layers C are of a modified polyethylene.

12. A plastics material as claimed in either one of claims 10 and 11 characterised in that layers C are of butene linear low density polyethylene.

13. A plastics material substantially as described herein with reference to any one of Examples 1, 2, 3A, 3B, 4 and 5.

14. A sanitary or writing receptive product incorporating a plastics material as claimed in any one of claims 6 to 13.

DATED : 6 June 1994
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AUSTRALIAN PATENT OFFICE

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ABSTRACT

A plastics material with at least first and second layers of plastic polymeric material, the material of the first layer having a melting point lower than the melting point of the material of the second layer. The layers are orientated and heated to at least the melting point of the first layer so that the first layer breaks up to form an irregular surface pattern bonded to the second layer. A method of producing the plastics material is also provided, the orientation and heating being done sequentially or simultaneously. The material has cloth-like properties with a "soft" feel and with minimal noise.

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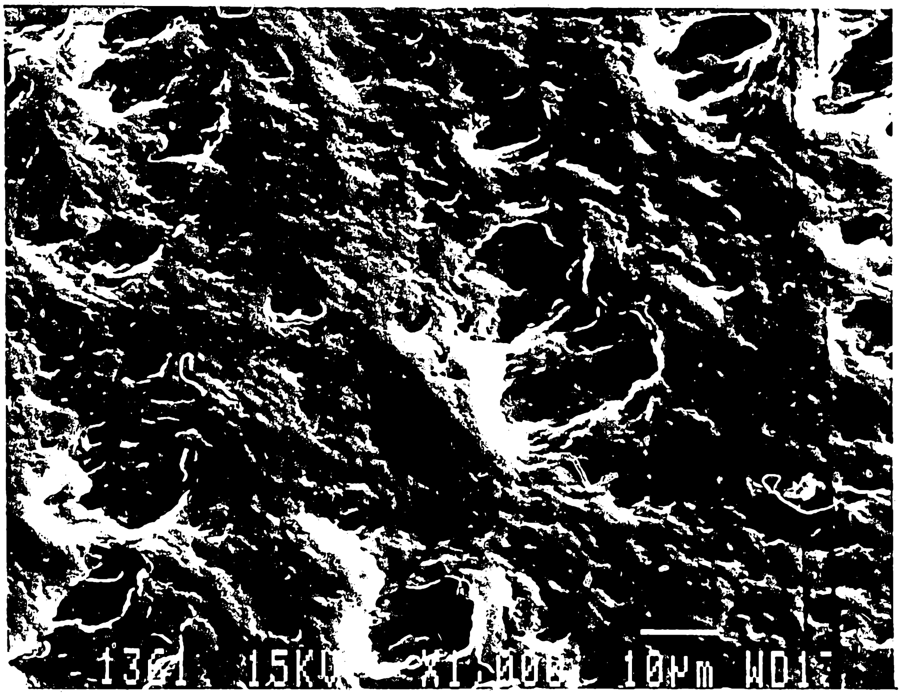
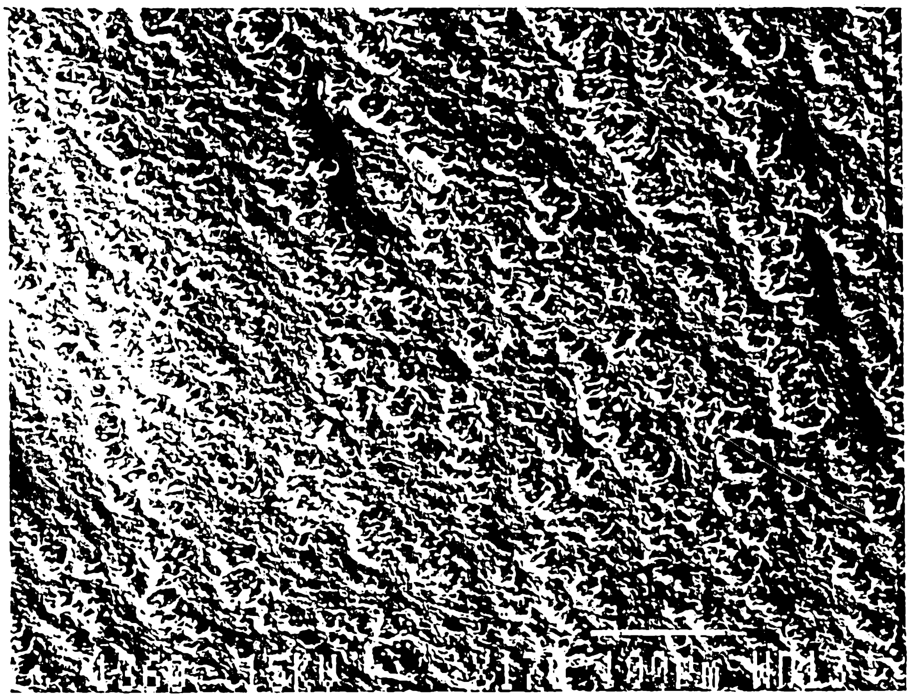


Figure 1



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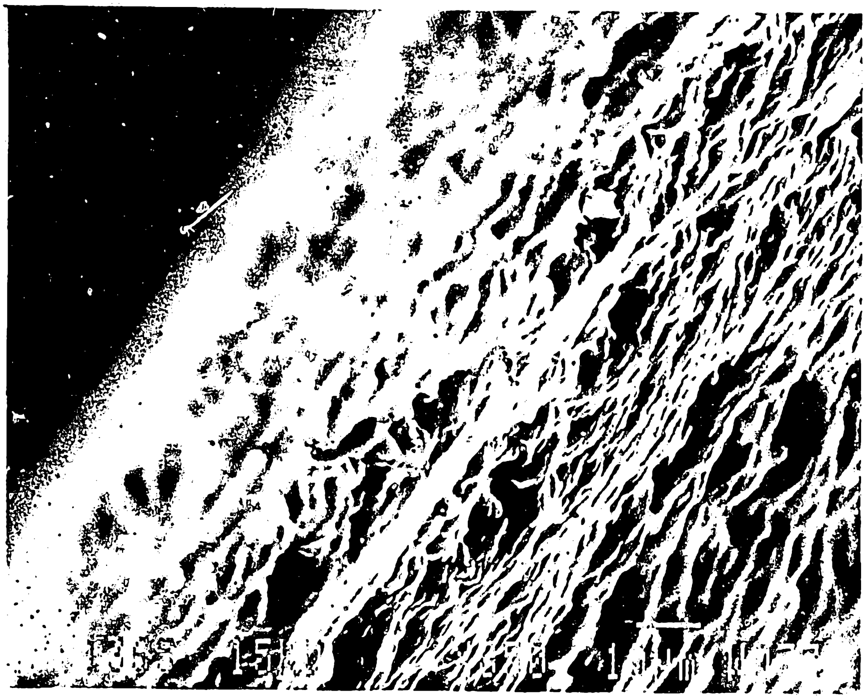

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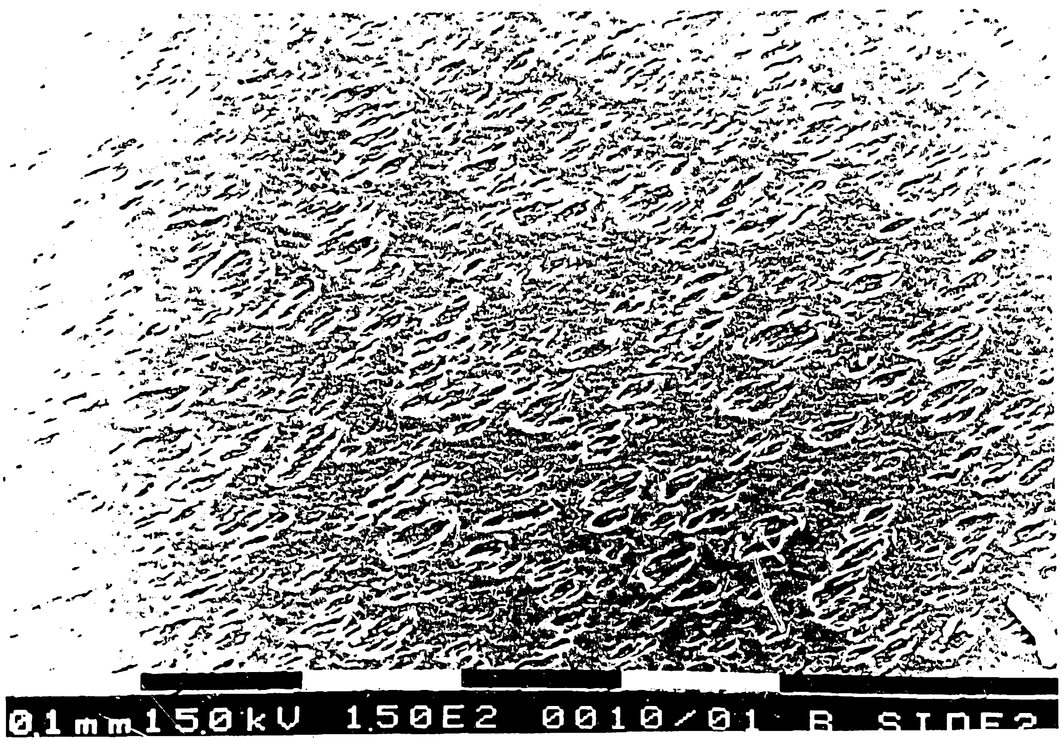

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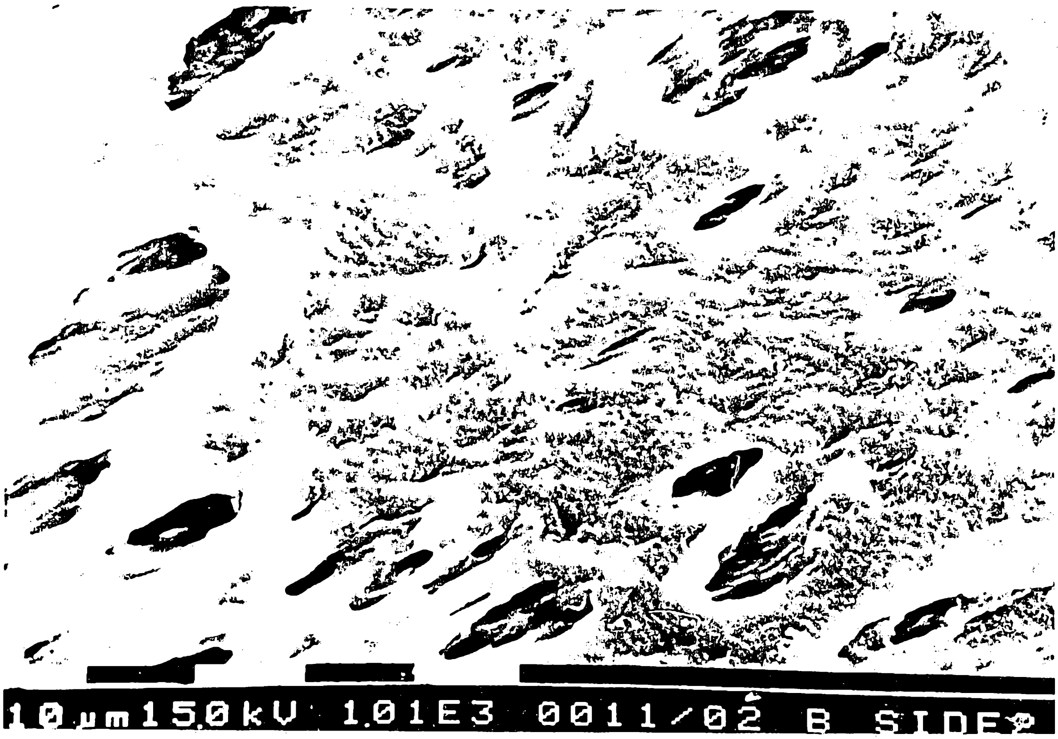


Figure 5

Figure 6

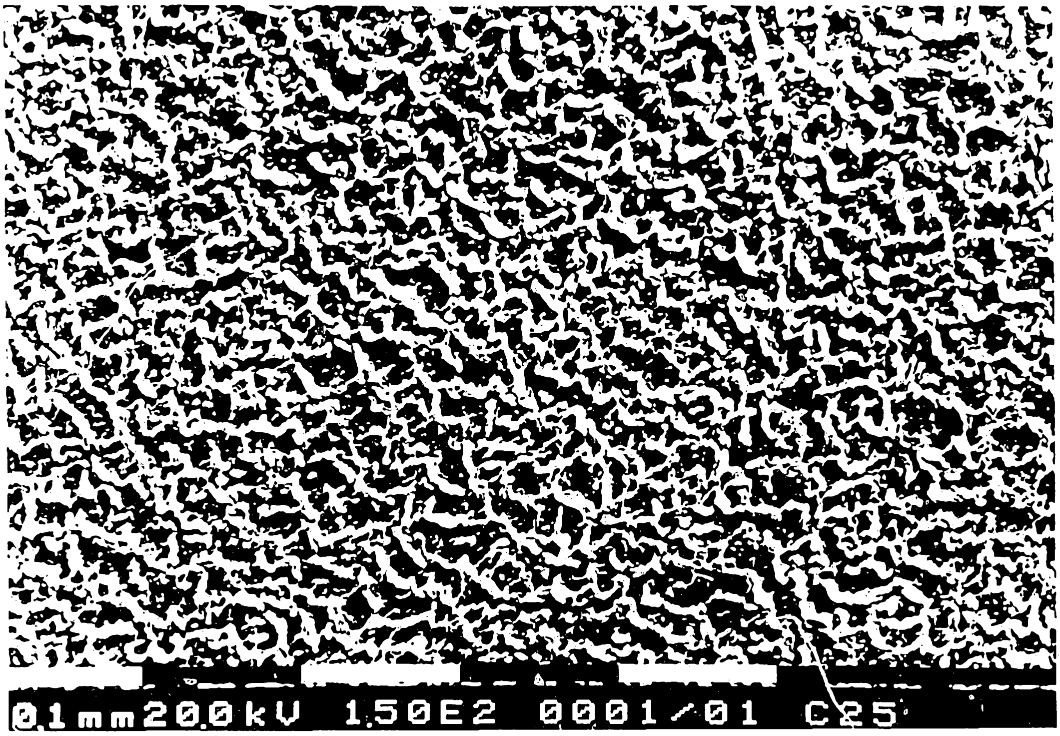
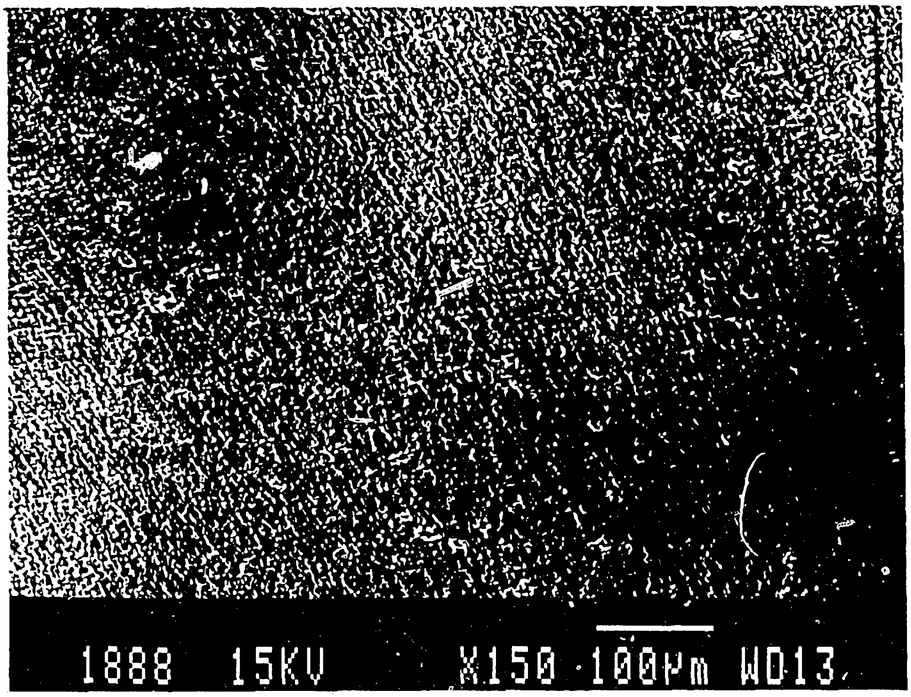


Figure 7

Figure 8



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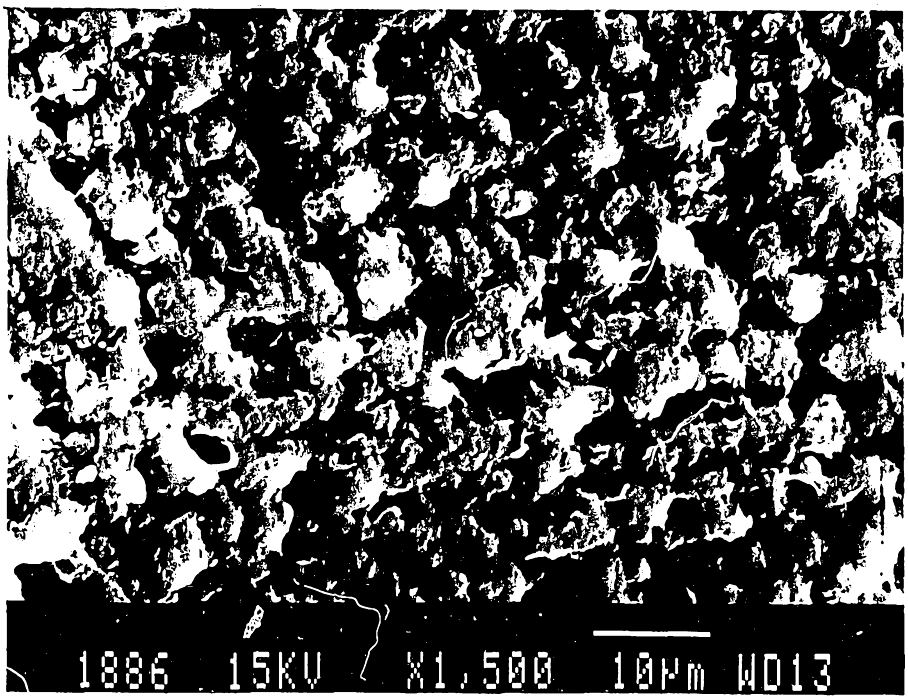

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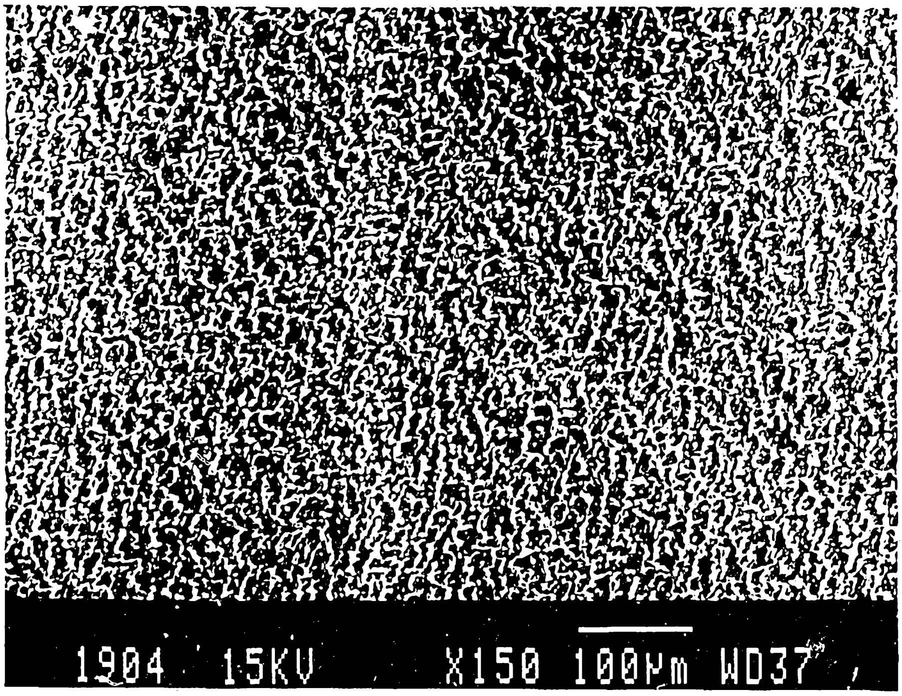

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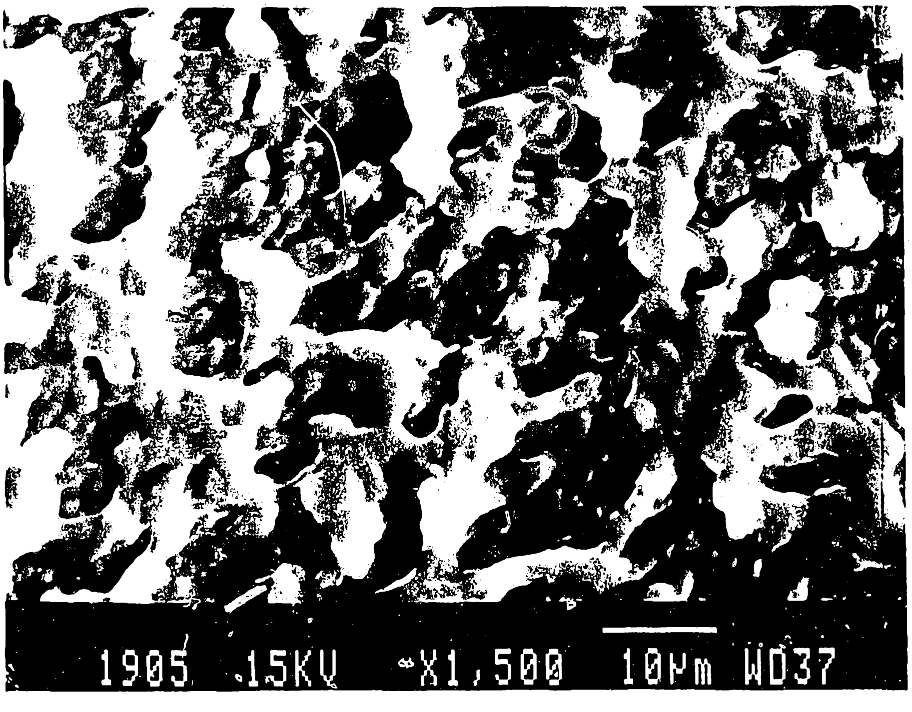

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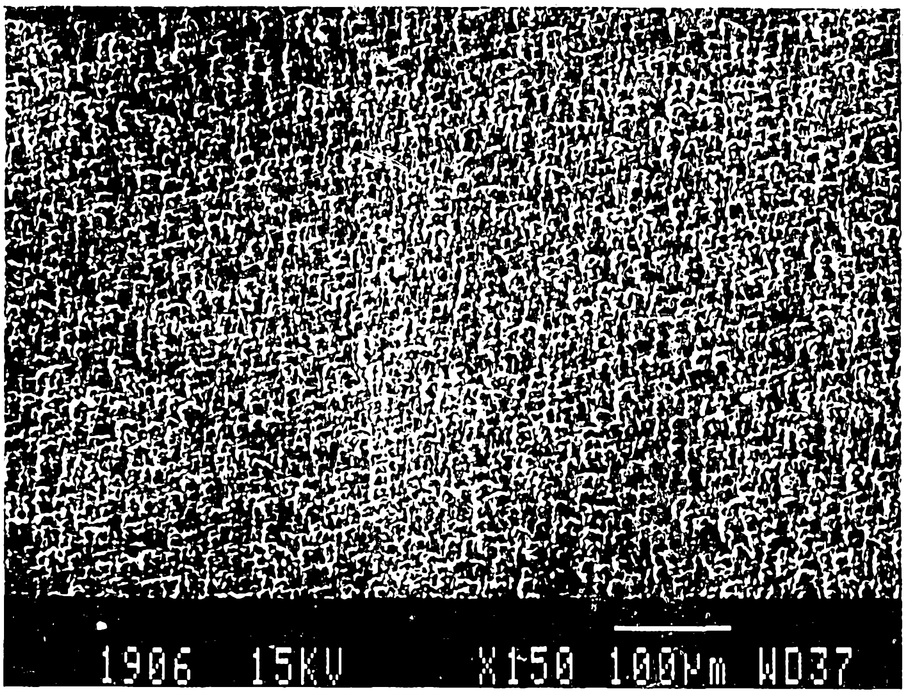

Figure 13

Figure 14