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Description

The present invention relates to an electroluminescent device comprising a substrate, a first electrode fixed to the substrate, an electroluminescent coating covering the first electrode, a second electrode covering substantially the whole of the electroluminescent coating, a first conductor contacting the first electrode, a second conductor contacting the second electrode, and a water vapor impervious coating extending over the first and second conductors with the possible exception of a terminal end portion thereof. The invention also relates to a method of fabricating such an electroluminescent device in accordance with the preamble of claim 8.

Such electroluminescent devices are useful in the form of cells, lamps and panels which generate light in response to an applied electrical signal. A typical device comprises a finely divided phosphor dispersed in a binder and distributed in a thin layer between two plate or sheet electrodes, at least one of the electrodes being substantially transparent. The application of an electrical signal to the two electrodes causes the phosphor material to emit light, part of which is directed outwardly through the substantially transparent electrode. The entire device is typically covered by an insulating coating which acts as a barrier to prevent later ingress of moisture or other elements which, if not excluded, contribute to failure of the device. The insulative layer also permits the device once formed to experience greater physical manipulation without failure.

Electroluminescent devices of the initially named kind, and a method of manufacturing such devices in accordance with the preamble of claim 8 are known from US-A-3,110,837 and US-A-3,205,393.

Both these prior art references disclose electroluminescent devices in which the electrical conductors take the form of strips of conductive material or bus bars which are mounted on the device in separate working steps from the formation of the associated electrode regions. This is disadvantageous for a number of reasons. Firstly, the conductors or bus bars have to be applied in separate working steps. Secondly, the material of the bus bars is different from that of the electrode regions, so that the working steps are of a different nature which involves a change in the manufacturing process. Thirdly, the use of bus bars makes it difficult to construct a number of devices simultaneously on a large single sheet of substrate which can thereafter be die cut to form the individual luminescent devices. Fourthly, it is difficult to maintain close tolerances when operating with such conductive strip/bus bar arrangements.

The principal object underlying the present invention is thus to provide a simplified device and a simplified method of manufacturing the same which can be economically manufactured to accurate tolerances with a minimum number of

working steps. In order to satisfy this object the present invention provides an electroluminescent device of the initially named kind which is characterised in that the electroluminescent coating has a first edge spaced inwardly from an edge of the first electrode to form an exposed strip portion on the first electrode; in that the electroluminescent coating has a second edge extending across a second edge of the first electrode directly onto the substrate; in that the first conductor extends along the exposed strip portion on the first electrode and onto a selected portion of the substrate to form a first bus; in that the second conductor is unitary with the second electrode and extends across said second edge of said electroluminescent coating onto a second selected portion of the substrate to form a second bus adjacent to, but electrically isolated from, the first bus.

Moreover, the present invention provides a development of the initially named method which is characterised by the characterising features of claim 8.

Thus, in accordance with the present invention, the first and second conductors are formed simultaneously with the second electrode and using one and the same method which results in a substantial simplification of the manufacturing process, and thus a saving in cost, and enables very accurate tolerances to be maintained.

The method used to form devices in accordance with the present teaching utilises a substrate which can be formed to include a body portion and a lead portion. The first electrode is deposited on the body portion of the substrate in a pre-selected pattern. The luminescent coating then covers a first portion of the first electrode with this first portion comprising only those areas which are intended to be excited by an applied electrical signal so as to emit light. A second portion, usually a peripheral portion, of the first conductor is left uncovered by the luminescent coating. The pair of first and second conductors are then deposited simultaneously adjacent to each other together with the second electrode overlying the luminescent coating. Both of the first and second conductors then extend from the body portion linearly along the lead portion of the substrate to form a two conductor lead of pre-selected length which terminates at the distal end of the lead portion of the substrate.

Electroluminescent devices are typically powered by a supply having an output signal in the audiofrequency range, preferably about 800 Hz. When such devices are used in closed proximity with audioamplifiers, or other circuits which may be responsive to a signal of such a frequency, some shielding must be employed to prevent interference. While the shielding can be incorporated in separate physical structure it is an object of the present invention to provide shielding which permits a lower total cost of construction and quicker assembly while also ensuring reliability of performance. In order to satisfy this further object a specially preferred electroluminescent device is characterised in that a conduc-

tive shielding layer is substantially coextensive with the water vapor impervious coating, the shielding layer including a terminal portion for connection to ground.

The grounding of this shielding layer ensures an effective shielding of the electrical signal applied to the device thereby preventing interference with desirable signals being processed by adjacent circuitry.

A further advantage of the device and method proposed herein is that a number of devices can be simultaneously formed on a large single sheet of substrate which is thereafter die cut to form the individual luminescent devices. The pin elements or other contact devices can be attached using conventional contact stapling techniques with high reliability of both dimensional tolerances and electrical continuity.

Further advantageous developments of the device and of the method for its manufacture are set forth in the subordinate claims.

Additional features and advantages of the invention will become apparent to those skilled in the art upon consideration of the following detailed description of a preferred embodiment exemplifying the best mode of carrying out the invention as presently perceived. The detailed description particularly refers to the accompanying figures in which:

Fig. 1 is a plan view showing the substrate and first conductor deposited in a preselected pattern;

Fig. 2 is a plan view showing the positioning of the luminescent coating over the first conductor so as to leave at least one edge of the first conductor uncovered;

Fig. 3 is a plan view showing the deposition of the pair of first and second conductors adjacent to each other with one conductor contacting the luminescent coating and the other conductor contacting the first electrode;

Fig. 4 is a plan view showing the insulative coating deposited over the entirety of the apparatus except the terminal portions of the first and second conductors.

Fig. 5 is a plan view showing the shielding layer deposited coextensively with the insulative layer and extending over the terminal portion of the second conductor.

Fig. 6 is a plan view similar to Fig. 5 showing an alternative embodiment with the shielding layer forming a third terminal.

Fig. 7 is a sectional view taken along line 7—7 of Fig. 5.

Fig. 8 is a sectional view similar to Fig. 7 showing the addition of a protective overlayer and a terminal pin.

An electroluminescent device 10 in accordance with the present teaching is illustrated in the various stages of its construction in Figs. 1 through 5 and in final form in Fig. 8. While each of the Figs. 1—6 illustrate only a single device 10, it will be appreciated that a plurality of similar devices 10 can be formed simultaneously on a single substrate 12, the devices being separated from each other at a later stage in the manufac-

ture. The device 10 comprises a substrate 12 onto which is deposited a first electrode 14 which can be deposited in a plurality of discrete areas. A luminescent coating 16 covers a first substantial portion 18 of the first electrode 14 while leaving a second generally peripheral portion 20 of the first electrode 14 uncovered. The luminescent coating is similarly positionable on a plurality of discrete areas. One portion 19 of the luminescent coating 16 extends beyond an edge 13 of the first electrode 14.

A pair of first and second conductors 24 and 22 are deposited adjacent to each other. The second conductor 22 is deposited so as to contact portion 19 and substantially cover the luminescent coating 16 to form a second electrode 26 parallel to the first electrode formed by first conductor 14. The second conductor 22 can form bridges 23 between various second electrodes 26. The first conductor 24 is deposited so as to contact only the substrate 12 and the first electrode 14 in the second or peripheral portion 20. The first conductor 24 thus forms an electrical lead or bus 25 for the first electrode 14.

An insulative layer 32 is deposited or positioned over the first and second conductors 24 and 22 so as to cover substantially all of the device 10. A shielding layer 38 is then deposited over substantially the entirety of the insulative layer 32 except for a free edge 40 adjacent the terminal end of the first conductor 24. As shown in Fig. 5, the shielding layer 38 extends over the terminal end of the second conductor 22 which forms the second electrode 26. In an alternative embodiment shown in Fig. 6, the shielding layer is extended to form a third terminal 44 adjacent to but insulated from the first and second conductors 24 and 22 by free edge 40 of insulative layer 32. A protective coating 42 can be applied over the shielding layer 38 as shown in Fig. 8 to protect it from abrasion and corrosion which might degrade its electrical performance.

The substrate 12 is shown to comprise a body portion 28 and a lead portion 30. While lead portion 30 is shown to extend outside the general periphery of the body portion 28, devices can be formed having lead portions within the periphery of the body portion 28. The substrate is preferably formed of a flexible transparent sheet material composed of a polymeric resin which is sufficiently form stable to prevent any mechanical stretching which might destroy the continuity of the various coated layers placed on that substrate. An example of a satisfactory material is a polyester such as biaxially oriented polyethylene terephthalate (PET). The body portion 28 and lead portion 30 are unitary and in general are cut from a single sheet of about 0.125 to 0.175 mm (0.005 to 0.007 inch) thickness subsequent to the deposition of the various layers disclosed herein.

The first electrode 14 comprises generally a substantially transparent metal oxide film which is spaced inwardly from the edge of substrate 12. Suitable metal oxide films can be formed of tin oxide, indium oxide, or nickel oxide with indium

tin oxide being preferred. Metal oxide films having an optical transmittance of 60% or greater can be achieved while maintaining electrical continuity throughout the layer, the layer having a sheet resistance of less than about 2000 ohms per square. The metal oxide film is preferably formed by silk screening a solvent solution of a polyester resin containing the metal oxide on the substrate 12. Alternatively, the metal oxide film may be formed in accordance with the general practices of U.S. Pat. 3,295,002.

The luminescent coating 16 is shown to cover substantially the whole of the first electrode 14 leaving only an edge portion 20 of the first electrode 14 exposed. The luminescent coating 16 generally comprises a light emitting layer 15 and an insulative, light reflecting layer 17 as shown in Fig. 7. The light emitting layer 15 generally comprises a mixture of a phosphor and a binder. The phosphor may be an inorganic compound such as zinc sulfide or zinc oxide combined with suitable activators such as copper, manganese, lead or silver. Alternatively, the phosphor may be an organic luminescent agent such as anthracene, naphthalene, butadiene, acridine or other similar material. The phosphor is mixed with a suitable binder which is selected to be compatible with the phosphor. Examples of suitable binders are polyvinyl chlorides, cellulose acetate, epoxy cements, and other similar materials. Particularly useful binders include cyanoethyl cellulose and ethyl hydroxyethyl cellulose.

The light reflective layer 17 is generally a mixture of a light reflective opacifier in a matrix which is itself a dielectric. The layer preferably has a dielectric constant of about 10 or greater, and a breakdown strength of at least 800 volts/mil. The reflective opacifier is generally a metal oxide powder such as titanium oxide, lead oxide or barium titanate in a resin matrix of acrylic, epoxy, or other suitable resin. The relative positioning of layers 15 and 17 is such that light is emitted from the device 10 through the substrate 12.

The pair of first and second conductors 24 and 22 are deposited, preferably simultaneously, so as to be positioned side by side on the lead portion 30 of the substrate 12. The second conductor 22 unitarily extends on top of the luminescent coating 16 so as to form the second electrode 26. The first conductor 24 extends merely over the second portion 20 of the first electrode 14 which was left uncovered by the luminescent coating 16. The first conductor 24 is spaced from the luminescent coating by a distance sufficient to insure electrical isolation of the first electrode 14 and first conductor 24 from the second electrode 26. The first and second conductors 24 and 22 including the second electrode portion 26 of second conductor 22 are formed of a particulate metal in colloidal form which is deposited in combination with an evaporable medium leaving behind a conductive film of particulate metal. A suitable material is a silver conductive coating material commercially available from Atcheson

Colloids Company, Port Huron, Michigan, under part name Electrodag 426SS (Electrodag is a registered trademark). Other types of fluid silver conductive materials are commercially available which may perform satisfactorily.

An insulative coating 32 is applied over the top of the various layers previously described to cover the entirety of the device as shown in Fig. 4. The insulative coating 32 preferably has a low dielectric constant of less than about 4 which acts to minimise the capacitive coupling from the circuit formed by the various layers 14, 16, 22, and 24 to the shielding layer 38. While low to medium density polyethylene and polymethylpentene materials generally may be satisfactory to form this layer, a particularly advantageous material is a biaxially oriented PET film coated on one side with about 0.025 mm (0.001 inch) of a cross-linking acrylic adhesive such as 3—M No. 467 (3—M is a registered trademark).

A shielding layer 38 is applied on top of and substantially coextensive with the insulative coating 32 as shown in Figs. 5—8. In one preferred embodiment shown in Fig. 5, the shielding layer 38 extends over the terminal portion of conductor 22. In another embodiment shown in Fig. 6, the shielding layer 38 includes a separate terminal 44 which can be attached to an appropriate ground to effect the desired shielding. In either embodiment the shielding layer can comprise a metal foil or metalised plastic film which can be cut to shape and directly applied, or a particulate metal in colloidal form which is deposited in a manner similar to first and second conductors 24 and 22. A suitable metalised plastic film is available in conjunction with easily handled release sheets from Flexcon, Inc. of Spencer, Mass. under part MM—100. A suitable particulate metal colloid is that indicated previously for conductors 22 and 24.

As shown in Fig. 8, a protective overcoat 42 can be applied over the shielding layer 38. The overcoat 42 is preferably abrasion resistant and moisture proof. While curable silicone materials generally may be satisfactory to form this layer, a particularly advantageous material is the polyester resins dissolved in a suitable carrier to be applied by overprinting.

The overcoat layer 42 can also be formed using the adhesively coated PET film disclosed for insulative layer 32. The PET or other similarly suitable polymeric film can include a second adhesive layer 46 and a removable release sheet 48 as shown in Fig. 7. The release sheet 48 is adapted to be removed to expose the adhesive layer 46 so as permit mounting of the finished product on other apparatus with which the device is intended to be used.

The completed assembly is easily die cut to the final desired configuration with a multiplicity of devices 10 being cut from a single substrate 12 and pin connectors 36 applied. In the embodiment shown in Fig. 8, the pin connector acts to electrically connect the shielding layer 38 to the conductor 22 which is then connected to a suit-

able ground. A suitable connector is AMP 88997—2 (AMP is a registered trademark).

The metal connectors 36 can be attached to the terminal portions of conductors 22 and 24 by stapling or other appropriate means. The spacing between the connector pins or elements 36 are set by the attaching equipment and by the spacing between the first and second conductors 24 and 22 as well as on terminal 44 where present as a separate terminal element. When the two conductors 22 and 24 are simultaneously formed, the distance between the two conductors is uniformly maintained and hence the connection with the shielding layer 38 and spacing of the pin connectors 36 can also be similarly maintained with very high reliability.

Claims

1. An electroluminescent device comprising a substrate (12), a first electrode (14) fixed to the substrate (12), an electroluminescent coating (16) covering the first electrode (14), a second electrode (26) covering substantially the whole of the electroluminescent coating (16), a first conductor (24) contacting the first electrode (14), a second conductor (22) contacting the second electrode (26), and a water vapor impervious coating (42) extending over the first and second conductors (24, 22) with the possible exception of a terminal end portion thereof, characterised in that the electroluminescent coating (16) has a first edge spaced inwardly from an edge of the first electrode (14) to form an exposed strip portion (20) on the first electrode (14); in that the electroluminescent coating (16) has a second edge extending across a second edge of the first electrode (14) directly onto the substrate (12); in that the first conductor (24) extends along the exposed strip portion (20) on the first electrode (14) and onto a selected portion of the substrate (12) to form a first bus; in that the second conductor (22) is unitary with the second electrode and extends across said second edge of said electroluminescent coating (16) onto a second selected portion of the substrate (12) to form a second bus adjacent to, but electrically isolated from, the first bus.

2. An electroluminescent device in accordance with claim 1, characterised in that the substrate (12) comprises a body portion (28) and a lead portion (30), the first electrode (14) and the electroluminescent coating (16) being confined to the body portion (28), and the first and second conductors (24, 22) extending from the body portion (28) along the lead portion (30) of the substrate (12) parallel to each other to the terminal end remote from the body portion (28).

3. An electroluminescent device in accordance with claim 2, characterised in that a pair of pin elements is attached to the terminal end of the first and second conductors (22, 24).

4. An electroluminescent device in accordance with any one of the claims 1 to 3, characterised in that a conductive shielding layer (38) is substantially coextensive with said water vapor

impervious coating (42), said shielding layer (38) including a terminal portion (44) for connection to ground.

5. An electroluminescent device in accordance with claim 4, characterised in that the terminal portion (44) of said shielding layer (38) overlies the terminal portion of one (21) of said first and second conductors (24, 22) and is electrically connected thereto.

6. An electroluminescent device in accordance with claim 4 or claim 5, characterised in that an insulating coating (32) is provided between said shielding layer and said first and second conductors (24, 22) and has a low dielectric constant of less than about four.

7. An electroluminescent device in accordance with any one of the claims 1 to 6, characterised by an adhesive layer (46) applied to an outside surface of the device and by a removable release sheet (48) situated on the adhesive layer (46) for later removal to permit mounting of the device.

8. A method of forming an electroluminescent device comprising the steps of depositing a first electrode (14) on a substrate (12), covering the first electrode (14) with an electroluminescent coating (16), covering substantially the whole of the electroluminescent coating (16) with a second electrode (26), providing a first conductor (24) contacting the first electrode (14) and a second conductor (22) contacting the second electrode (26), and applying a water vapor impervious coating (42) extending over said first and second conductors (24, 22) with the possible exception of a terminal end portion thereof; characterised in that the positioning of the electroluminescent coating (16) is restricted to expose a strip portion (20) on a first edge of the first electrode (14) by extending a portion of the electroluminescent coating (16) across a second edge of the first electrode onto the substrate (12); in that thereafter the first and second conductors (24, 22) and the second electrode (26) are simultaneously deposited in a single step, with the first conductor (24) extending along said exposed strip portion (20) on said first electrode (14) and onto a selected portion of the substrate (12) to form a first bus, and with the second conductor (22) and the second electrode (26) being unitary and extending across said second edge of said electroluminescent coating onto a second selected portion of said substrate (12) to form a second bus adjacent to, but electrically isolated from, said first bus.

9. A method in accordance with claim 8, characterised by the step of attaching a pin element (36) to each of the terminal end portions of said first and second conductors (24, 22).

10. A method in accordance with either of claim 8 or claim 9, characterised by the step of depositing a conductive shielding layer (38) substantially coextensive with said water vapor impervious coating (42), said shielding layer (38) including a terminal portion (44) adapted to be connected to a suitable ground.

11. A method in accordance with any one of the preceding claims 8 to 10, characterised by the

step of applying an adhesive layer (46) to an outside surface of the device and situating a removable release sheet (48) over the adhesive layer (46) for later removal to permit mounting of the device.

Patentansprüche

1. Elektrolumineszenz-Gerät mit einem Substrat (12), einer an dem Substrat (12) befestigten ersten Elektrode (14), einer die erste Elektrode (14) überdeckenden Elektrolumineszenz-Beschichtung (16), einer im wesentlichen die Gesamtheit der Elektrolumineszenz-Beschichtung (16) überdeckenden zweiten Elektrode (26), einem die erste Elektrode (14) kontaktierenden ersten Leiter (14), einem die zweite Elektrode (26) kontaktierenden zweiten Leiter und einer für Wasserdampf undurchdringlichen, sich über den ersten und zweiten Leiter (24, 22) mit der möglichen Ausnahme eines jeweiligen Anschlußendes erstreckenden Beschichtung (42), dadurch gekennzeichnet, daß die Elektrolumineszenz-Beschichtung (16) eine erste Kante besitzt, die von einer Kante der ersten Elektrode (14) nach innen Abstand aufweist zur Ausbildung eines freigesetzten Streifenabschnittes (20) an der ersten Elektrode (14); daß die Elektrolumineszenz-Beschichtung (16) eine sich quer über eine zweite Kante der ersten Elektrode (14) direkt bis auf das Substrat (12) erstreckende zweite Kante besitzt; daß der erste Leiter (24) sich längs des freigesetzten Streifenabschnittes (20) auf der ersten Elektrode (14) und auf einen ausgewählten Abschnitt eines Substrates (12) erstreckt, um einen ersten Anschlußleiter zu bilden; daß der zweite Leiter (22) mit der zweiten Elektrode einheitlich ausgebildet ist und sich quer über die zweite Kante der Elektrolumineszenz-Beschichtung bis zu einem zweiten ausgewählten Abschnitt des Substrates (12) erstreckt, um einen zweiten Anschlußleiter benachbart zu, jedoch elektrisch isoliert von dem ersten Anschlußleiter zu bilden.

2. Elektrolumineszenz-Gerät nach Anspruch 1, dadurch gekennzeichnet, daß das Substrat (12) einen Körperabschnitt (28) und einen Zuleitungsabschnitt (30) umfaßt, daß die erste Elektrode (14) und die Elektrolumineszenz-Beschichtung (16) auf den Körperabschnitt (28) begrenzt sind und daß der erste und der zweite Leiter (24, 22) sich von dem Körperabschnitt (28) längs des Zuleitungsabschnittes (30) des Substrates (12) parallel zueinander zu dem von dem Körperabschnitt (28) abgelegenen Anschlußende erstrecken.

3. Elektrolumineszenz-Gerät nach Anspruch 2, dadurch gekennzeichnet, daß an dem Anschlußende des ersten und des zweiten Leiters (22, 24) ein Stiftelementepaar angebracht ist.

4. Elektrolumineszenz-Gerät nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, daß eine leitende Abschirmschicht (38) sich im wesentlichen gleich erstreckt mit der wasserdampf-undurchlässigen Beschichtung (42), wobei die Abschirmschicht (38) einen Anschlußabschnitt (44) zur Verbindung mit Masse enthält.

5. Elektrolumineszenz-Gerät nach Anspruch 4, dadurch gekennzeichnet, daß der Anschlußabschnitt (44) der Abschirmschicht (38) den Anschlußabschnitt eines von den ersten und zweiten Leitern (24, 22) überdeckt und elektrisch damit verbunden ist.

6. Elektrolumineszenz-Gerät nach Anspruch 4 oder 5, dadurch gekennzeichnet, daß eine isolierende Beschichtung (32) zwischen der Abschirmschicht und dem ersten und dem zweiten Leiter (24, 22) vorgesehen ist, und niedrige die Elektrizitätskonstante von weniger als etwa vier besitzt.

7. Elektrolumineszenz-Gerät nach einem der Ansprüche 1 bis 6, gekennzeichnet durch eine an einer Außenfläche des Gerätes angebrachte Klebeschicht (46) und durch eine entfernbare Ablöschschicht (48), die an der Klebeschicht (46) zur späteren Entfernung angebracht ist, um ein Anbringen des Gerätes zu erlauben.

8. Verfahren zum Ausbilden eines Elektrolumineszenz-Gerätes, bei dem eine erste Elektrode (14) auf einem Substrat (12) abgeschieden wird, die erste Elektrode (14) mit einer Elektrolumineszenz-Beschichtung (16) bedeckt wird, im wesentlichen die Gesamtheit der Elektrolumineszenz-Beschichtung (16) mit einer zweiten Elektrode (26) bedeckt wird, ein die erste Elektrode (14) kontaktierender erster Leiter (24) und ein zweiter, die zweite Elektrode (26) kontaktierender Leiter (22) geschaffen werden und eine wasserdampf-undurchlässige Beschichtung (42) aufgebracht wird, die sich über den ersten und zweiten Leiter (24, 22) mit der möglichen Ausnahme je eines Anschlußendabschnittes derselben erstreckt; dadurch gekennzeichnet, daß das Anbringen der Elektrolumineszenz-Beschichtung (16) beschränkt wird, um einen Streifenabschnitt (20) an einer ersten Kante der ersten Elektrode (14) freizusetzen durch Erstrecken eines Abschnittes der Elektrolumineszenz-Beschichtung (16) quer über eine zweite Kante der ersten Elektrode auf das Substrat (12); daß danach der erste und der zweite Leiter (24, 22) und die zweite Elektrode (26) gleichzeitig in einem einzigen Verfahrensschritt abgeschieden werden, wobei der erste Leiter (24) sich längs des freigesetzten Streifenabschnittes (20) an der ersten Elektrode (14) und bis zu einem ausgewählten Abschnitt des Substrates (12) erstreckt, um einen ersten Anschlußleiter zu bilden, und der zweite Leiter (22) und die zweite Elektrode (26) einheitlich sind und sich quer über die zweite Kante der Elektrolumineszenz-Beschichtung bis auf einen zweiten ausgewählten Abschnitt des Substrates (12) erstrecken, um einen zweiten Anschlußleiter benachbart zu, jedoch elektrisch isoliert von dem ersten Anschlußleiter zu bilden.

9. Verfahren nach Anspruch 8, dadurch gekennzeichnet, daß je ein Stiftelement (36) an den jeweiligen Anschlußendabschnitten des ersten und des zweiten Leiters (24, 22) angebracht wird.

10. Verfahren nach einem der Ansprüche 8 oder 9, dadurch gekennzeichnet, daß eine leitende Abschirmschicht (36) im wesentlichen gleicherstreckend mit der wasserdampf-undurchlässigen

Beschichtung (42) abgeschieden wird, wobei die Abschirmschicht (38) einen zur Verbindung mit einer entsprechenden Masse geeigneten Anschlußabschnitt (44) enthält.

11. Verfahren nach einem der vorangehenden Ansprüche 8 bis 10, dadurch gekennzeichnet, daß eine Klebeschicht (46) an einer Außenfläche des Gerätes angebracht und eine entfernbare Ablöschschicht (48) über die Klebeschicht (46) gesetzt wird zur späteren Entfernung, um ein Anbringen des Gerätes zu ermöglichen.

Revendications

1. Dispositif électroluminescent, comprenant un substrat (12), une première électrode (14) fixée au substrat (12), un revêtement électroluminescent (16) recouvrant la première électrode (14), une seconde électrode (26) recouvrant la quasi-totalité du revêtement électroluminescent (16), un premier conducteur (24) en contact avec la première électrode (14), un second conducteur (22) en contact avec la seconde électrode (26), et un revêtement (42) imperméable à la vapeur d'eau, recouvrant les premier et second conducteurs (24, 22) à l'exception possible d'une portion d'extrémité terminale de ces conducteurs, caractérisé en ce que le revêtement électroluminescent (16) présente un premier bord espacé vers l'intérieur d'un bord de la première électrode (14) pour former une bande découverte (20) sur la première électrode (14); en ce que le revêtement électroluminescent (16) comprend un second bord s'étendant en travers du second bord de la première électrode (14) directement sur le substrat (12), en ce que le premier conducteur (24) s'étend le long de la bande découverte (20) sur la première électrode (14) et jusque sur une portion choisie du substrat (12) pour former une première barre omnibus; en ce que le second conducteur (22) fait bloc avec la seconde électrode et s'étend au travers du second bord dudit revêtement électroluminescent (16) jusque sur une seconde portion choisie du substrat (12) pour former une seconde barre omnibus qui est adjacente à la première mais qui en est isolée électriquement.

2. Dispositif électroluminescent suivant la revendication 1, caractérisé en ce que le substrat (12) comprend un corps (28) et une portion conductrice (30), la première électrode (14) et le revêtement électroluminescent (16) étant limités à la portion (28) constituant le corps, et les premier et second conducteurs (24, 22) s'étendant depuis la portion corps (28) le long de la portion conductrice (30) du substrat (12) parallèlement l'une à l'autre jusqu'à l'extrémité terminale distante de la portion corps (28).

3. Dispositif électroluminescent suivant la revendication 2, caractérisé en ce qu'une paire de broches est fixée à l'extrémité terminale des premier et second conducteurs (22, 24).

4. Dispositif électroluminescent suivant l'une quelconque des revendications 1 à 3, caractérisé en ce qu'une couche de protection (38) conductrice a pratiquement la même étendue que le

revêtement (42) imperméable à la vapeur d'eau, ladite couche protectrice (38) comprenant une portion terminale (44) pouvant être reliée à la terre.

5. Dispositif électroluminescent suivant la revendication 4, caractérisé en ce que la portion terminale (44) de ladite couche protectrice (38) recouvre la portion terminale de l'un (21) de premier et second conducteurs (24, 22) et y est connectée électriquement.

6. Dispositif électroluminescent suivant la revendication 4 ou la revendication 5, caractérisé en ce qu'un revêtement isolant (32) est prévu entre la couche protectrice et les premier et second conducteurs (24, 22) et présente une faible constante diélectrique inférieure à environ quatre.

7. Dispositif électroluminescent suivant l'une quelconque des revendications 1 à 6, caractérisé par une couche adhésive (46) appliquée sur une face extérieure du dispositif et par une feuille anti-adhésive (48) amovible située sur la couche adhésive (46) et pouvant être enlevée ultérieurement pour permettre le montage du dispositif.

8. Procédé pour former un dispositif électroluminescent, qui comprend les étapes consistant à déposer une première électrode (14) sur un substrat (12), à recouvrir la première électrode (14) d'un revêtement électroluminescent (16), à recouvrir la quasi-totalité du revêtement électroluminescent (16) d'une seconde électrode (26), à mettre en place un premier conducteur (24) en contact avec la première électrode (14) et un second conducteur (22) en contact avec la seconde électrode (26), et à appliquer un revêtement (42) imperméable à la vapeur d'eau, recouvrant lesdits premier et second conducteurs (24, 22) à l'exception possible d'une portion d'extrémité terminale de ces conducteurs; caractérisé en ce que la position occupée par le revêtement électroluminescent (16) est limitée de manière à laisser découverte une bande (20) sur le premier bord de la première électrode (14) par extension d'une portion du revêtement électroluminescent (16) au travers d'un second bord de la première électrode jusque sur le substrat (12), en ce que les premier et second conducteurs (24, 22) et la seconde électrode (26) sont ensuite déposés simultanément en une étape unique, le premier conducteur (24) s'étendant le long de la bande découverte (20) sur la première électrode (14) et jusque sur une portion choisie du substrat (12) pour former une première barre omnibus, et le second conducteur (22) et la seconde électrode (26) formant bloc s'étendant au travers du second bord dudit revêtement électroluminescent jusque sur une seconde portion choisie du substrat (12) pour former une seconde barre omnibus qui est adjacente à la première mais qui en est isolée électriquement.

9. Procédé suivant la revendication 8, caractérisé par l'étape qui consiste à attacher une broche (36) à chacune des portions d'extrémités terminales desdits premier et second conducteurs (24, 22).

10. Procédé suivant l'une des revendications 8

et 9, caractérisé par l'étape consistant à déposer une couche de protection (38) conductrice pratiquement de même étendue que le revêtement (42) imperméable à la vapeur d'eau, ladite couche de protection (38) comprenant une borne (44) conçue pour être reliée à une masse convenable.

11. Procédé suivant l'une quelconque des

revendications 8 à 10, caractérisé par l'étape consistant à appliquer une couche adhésive (46) à une surface extérieure du dispositif et à disposer une feuille anti-adhésive (48) amovible par-dessus la couche adhésive (46), qui peut être enlevée ultérieurement afin de permettre le montage du dispositif.

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