

BRIEF DESCRIPTION OF THE DRAWINGS

[0030] The teachings of the invention can be readily understood by considering the following detailed description in conjunction with the accompanying drawings, in which:

[0031] FIGS. 1A to 1E are flow charts illustrating the invention (Embodiment mode);

[0032] FIGS. 2A and 2B are diagrams illustrating one form of plastic molding (Embodiment mode);

[0033] FIGS. 3A to 3B are flow charts of fabricating a semiconductor device having an organic light emitting diode (Embodiment 1);

[0034] FIGS. 4A to 4E are flow charts of fabricating a semiconductor device having liquid crystals (Embodiment 2);

[0035] FIG. 5 is a diagram of an apparatus for fabricating a semiconductor device having an organic light emitting diode with the invention (Embodiment 3);

[0036] FIG. 6 is a diagram illustrating inside a car and around an automobile windowshield (Embodiment 4);

[0037] FIG. 7 is a diagram illustrating inside the car and around a rear window (Embodiment 4); and

[0038] FIGS. 8A-F are diagrams illustrating the cross sections around TFTs and light emitting diodes contained in peeled layers (Embodiment 5).

DESCRIPTION OF THE PREFERRED EMBODIMENT

[0039] [Embodiment Mode]

[0040] Hereafter, the embodiments of the invention will be described by FIGS. 1A to 1E, and 2A and 2B, according to the typical fabrication procedures.

[0041] FIG. 1A shows a first step of fabricating a support 111 and a transfer object 112. It is important to fabricate them to have a desired curvature according to the purposes, particularly to fabricate the support 111 to have elasticity. The curvature radius of the support 111 after the first step is finished is defined as R_i . The raw materials, material quality and shaping methods are not defined in particular. The thickness is not limited in particular as well. Typically, it is fine to have a thickness of about 100 micrometers. Generally, those having a film thickness of 200 micrometers or below are called a film, and those of 200 micrometers or greater are called a sheet. It is acceptable that the support 111 and the transfer object 112 are a film or sheet. As for the support 111, it is fine that the support is so thin that it has elasticity. Here, plastics are used for both the support 111 and the transfer object 112. With the use of general thermoplastic resins or thermosetting resins as raw materials, they are shaped by general plastic molding, that is, in the course of plasticization in which a raw material is heated for easy flow, shaping in which a mold is used to give a desired shape, and solidification in which the shape is stabilized by cooling or curing reaction. For example, FIGS. 2A and 2B show the steps of compression molding of a thermosetting resin. First, as shown in FIG. 2A, a thermosetting resin 212, which is heated with high flowability, is filled in a mold (female mold) 211b. Then, as shown in FIG. 2B, a mold

(male mold) 211a is used to apply pressure from the direction indicated by arrows. When the molds 211a and 211b are heated as the pressure is held, the flowability of the resin drops at some point for curing. Subsequently, the molds 211a and 211b are opened to obtain a molded product.

[0042] In addition, a coating film with various functions (not shown) can be deposited in a single layer or multiple layers over the support 111 and the transfer object 112. Generally, a barrier film for blocking water and oxygen, a base film for improving the adhesion of adhesives, and a protection layer for enhancing chemical resistance and physical strength are laminated. For example, a silicon nitride thin film having a thickness of about 100 nm can be deposited over the support 111 by sputtering. However, at least one of the support 111 and the transfer object 112 needs to have a limited light transmittance, that is, to be transparent.

[0043] FIG. 1B shows a second step of fabricating a peeled layer 121 on a substrate 122. The peeled layer comprises various devices, typically TFTs (thin film diodes, and photoelectric conversion devices formed of pin-junctions of silicon junctions, and silicon resistance elements) and an organic light emitting diode, generally including electrodes, wiring lines and insulating films. The rigidity of the substrate 122 is set higher than that of the support 111. In FIG. 1B, the substrate 122 is illustrated so as to be fully covered with the peeled layer 121 for simplification, but it is no problem to partially expose the substrate 122.

[0044] FIG. 1C shows a third step of bonding the support 111 to the substrate 122 and the peeled layer 121. First, an external force is applied to the support 111 to shape it into a form matched with the surface topology of the substrate 122 and the peeled layer 121. For example, it is fine that the support 111 originally curved as shown in FIG. 1A is stretched straight and bonded as shown in FIG. 1C. After bonded, the restoring force to return to the original shape is exerted over the support 111, but the bonded substrate 122 has higher rigidity, and thus the support 111 keeps the state of being stretched straight at this stage. More specifically, when the curvature radius of the support 111 after the third step is finished is defined as R_m , the curve of the support 111 becomes smoother than that after the first step is finished in general, and therefore it is generally $R_i \leq R_m$. As the bonding method, it is preferable to closely contact the support 111 with the peeled layer 121 or the support 111 with the substrate 122, but a limited space may exist inside.

[0045] Types of adhesives (not shown) and the coating method are not defined particularly. More specifically, it is acceptable that the reactive curing type, thermosetting type, photo-curing type and anaerobic type of adhesives are coated by techniques including screen printing, drawing by a dispenser and discharge by a spray. Here, a UV cure adhesive, which is one kind of the photo-curing type, is coated by a dispenser. The adhesive is coated over the support 111 or peeled layer 121, and then ultraviolet rays are irradiated, whereby the adhesive is cured. Generally, the peeled layer 121 has portions to be damaged by irradiating the ultraviolet rays. Therefore, it is fine to use a proper light shielding mask for covering the portions, and alternatively to irradiate ultraviolet rays having selective energy that cures only the adhesive and does not damage the other portions, whereby damages are avoided.