[0033] The OLED device can be controlled using conventional means with driver circuitry external to the substrate. For OLED devices with a larger number of light emissive elements, a larger number of driver circuits may be necessary and operated in parallel to reduce the flicker inherent in operating a high-resolution display one emissive element, row, or column at a time.

[0034] In an alternative embodiment of the present invention, active switching devices such as thin-film transistors may be deposited on the substrate to simplify the external control of the device. If the curve of the substrate is sufficiently low and the deposition of active switching devices is limited to an area, for example along one flat edge, conventional processes may be used. This is useful for providing on-substrate row or column drivers that are typically found at the edge of a substrate. Alternatively, known means for depositing active switching devices on curved substrates may be employed. For example, U.S. Pat. No. 6,416,908 BI issued Jul. 9, 2002 to Klosner et al. describes the use of a high-resolution lens to image a curved mask directly onto a curved substrate, and U.S. Pat. No. 5,552,249 issued Sep. 3, 1996 to Jensen et al. describes patterning curved surfaces. Using these known techniques, active switching devices can be complemented with the organic materials deposition process of the present invention to create an OLED device with active components.

[0035] The present invention may be used in both top- and bottom-emitting OLED devices. In a top-emitting device, the device emits light through a cover protecting and encapsulating the OLED light emissive materials. This cover may comprise, for example, a coated layer or a curved glass cover adhered at the edges of the cover to the substrate. Suitable materials and adhesives are well-known and commercially available. The substrate may be opaque or reflective. In a bottom-emitting OLED device, the light is emitted through the substrate. In this case, the cover may be opaque or reflective and the substrate is transparent. Suitable transparent materials, such as glass, are well known and in use today. It is also possible to use transparent materials for both the substrate and the cover, thereby permitting light to escape from the OLED device through both sides.

[0036] The present invention may be applied to a variety of OLED light emitting devices. In particular, the light emissive curved rigid substrate of the present invention is well adapted to use for area illumination. In this embodiment, only one or a relatively small number of light emissive areas that are largely co-extensive with the rigid curved substrate need be formed on the substrate. Simpler masks with one or several openings may be used. Fewer connections are necessary for powering the area illumination device and a large variety of configurations and shapes may be provided.

[0037] The present invention may also be applied to information display devices. In particular, applications requiring a relatively large display for a single user are well adapted to the use of a curved substrate display, for example a panoramic computer monitor for desktop use. These display devices may be top emitter or bottom emitter, passive matrix or active matrix and may employ different control schemes requiring various numbers of controllers and connections, as described above. Referring to **FIG. 8, a** computer monitor **90** includes an OLED display device with a curved rigid substrate according to the present invention that is employed as a component within an otherwise conventional desktop computer. In a further embodiment of the present invention, the curved monitor is a panoramic display, that is one that has at least a 16:9 ratio between height and width and subtends at least 45 degrees when viewed at a normal viewing distance.

[0038] In a preferred embodiment, the invention is employed in a device that includes Organic Light Emitting Diodes (OLEDs) which are composed of small molecule or polymeric OLEDs as disclosed in but not limited to U.S. Pat. No. 4,769,292, issued Sep. 6, 1988 to Tang et al., and U.S. Pat. No. 5,061,569, issued Oct. 29, 1991 to VanSlyke et al. Many combinations and variations of organic light emitting displays can be used to fabricate such a device.

[0039] General Device Architecture

[0040] The present invention can be employed in most OLED device configurations. These include very simple structures comprising a single anode and cathode to more complex devices, such as passive matrix displays comprised of orthogonal arrays of anodes and cathodes to form pixels, and active-matrix displays where each pixel is controlled independently, for example, with thin film transistors (TFTs).

[0041] There are numerous configurations of the organic layers wherein the present invention can be successfully practiced. A typical structure is shown in **FIG. 9** and is comprised of a substrate **101**, an anode **103**, a hole-injecting layer **105**, a hole-transporting layer **107**, a light-emitting layer **109**, an electron-transporting layer **111**, and a cathode **113**. These layers are described in detail below. Note that the substrate may alternatively be located adjacent to the cathode, or the substrate may actually constitute the anode or cathode. The organic layers between the anode and cathode are conveniently referred to as the organic EL element. The total combined thickness of the organic layers is preferably less than 500 nm.

[0042] The anode and cathode of the OLED are connected to a voltage/current source **250** through electrical conductors **260**. The OLED is operated by applying a potential between the anode and cathode such that the anode is at a more positive potential than the cathode. Holes are injected into the organic EL element from the anode and electrons are injected into the organic EL element at the anode. Enhanced device stability can sometimes be achieved when the OLED is operated in an AC mode where, for some time period in the cycle, the potential bias is reversed and no current flows. An example of an AC driven OLED is described in U.S. Pat. No. 5,552,678.

[0043] Substrate

[0044] The OLED device of this invention is typically provided over a supporting substrate where either the cathode or anode can be in contact with the substrate. The electrode in contact with the substrate is conveniently referred to as the bottom electrode. Conventionally, the bottom electrode is the anode, but this invention is not limited to that configuration. The substrate can either be transmissive or opaque. In the case wherein the substrate is transmissive, I reflective or light absorbing layer is used to reflect the light through the cover or to absorb the light, thereby improving the contrast of the display. Substrates can