required to change the image on the display. In other words, once an image is written to an adaptable display, the power source may be removed without any significant effect on the displayed image over a certain time period. It is noted that adaptable displays and skins may require periodic refreshing using low duty cycle refresh power, (for example, once an hour, once a day, or less frequently). Displays that are not adaptable require constant power to maintain a displayed image. Electrochromic displays, bistable LCDs, electrophoretic displays, electrowetting displays, nemoptic displays, cholesteric LCDs, dielectrophoresis displays, and anisotropically rotating ball displays are a few examples of adaptable display technologies. It is noted that electrochromic displays operate by changing the reduction states of a viologen. Viologens that have multiple reduction states are considered adaptable within the meaning described above because the viologen will maintain a given reduction state in the absence of an applied electrical charge.

[0022] Referring to FIG. **1**, a portable electronic device **100** is shown. For convenience, a cellular phone is shown; although the present invention applies to any type of portable electronic device **100**. The portable electronic device **100** includes a display **110**, an input device **120**, and an adaptable skin **130**. The display **110** may be used for displaying information to a user of the device. The display **110** will typically be an LCD, but may be any type of display. The input device **120** is shown as a numeric keypad, but may be any type of input device such as a keyboard or click wheel, based on the type and function of portable electronic device **100**. Although not shown, the portable electronic device **100** may further include various input and output devices, such as a speaker, microphone, and the like, based on its functionality.

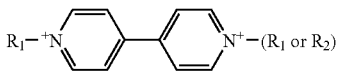
[0023] The adaptable skin **130** may be an electrochromic display, an LCD, an adaptable LCD, an electrophoretic display, an electrowetting display, a nemoptic display, a cholesteric LCD, a dielectrophoresis display, or an anisotropically rotating ball display. The adaptable skin **130** may comprise a plurality of pixels or segments. The pixels or segments may be directly driven by a dedicated or semi-dedicated routing track, or may be selectively driven using a matrix driving architecture, such as a passive or active matrix.

[0024] In a presently preferred embodiment, the adaptable skin **130** comprises an electrochromic display. Referring to FIG. **2**, a segment driven adaptable electrochromic skin **200** comprises a base substrate **210** that supports a transparent conductor layer **220**, which may be, for example, a layer of fluorine doped tin oxide (FTO) or indium doped tin oxide (ITO). The base substrate **210** is preferably flexible, however, it may also be molded to fit the contour of a selected portable electronic device. A nanoporous-nanocrystalline (nano-structured) semi-conducting film **230** is deposited, preferably by way of screen printing or ink jet printing, on the transparent conductor **220**. The nano-structured film **230** is typically a doped metal oxide, such as antimony tin oxide (ATO). Optionally, a redox reaction promoter compound is adsorbed on the nano-structured film **230**. An ion-permeable reflective layer **240**, typically white titanium dioxide (TiO_2), is optionally deposited, again preferably by way of screen printing or ink jet printing followed by a sintering step, on the nano-structured film **230**.

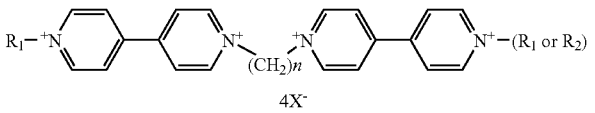
[0025] A second flexible substrate **250**, which is transparent, supports a transparent conductor layer **260**, which may be a layer of FTO or ITO. A nano-structured film **270** having a redox chromophore **275** adsorbed thereto is deposited on the transparent conductor **260**, by way of a self-assembled mono-layer deposition from solution.

[0026] The semiconducting metallic oxide may be an oxide of any suitable metal, such as, for example, titanium, zirconium, hafnium, chromium, molybdenum, tungsten, vanadium, niobium, tantalum, silver, zinc, strontium, iron (Fe^{2+} or Fe^{3+}) or nickel or a perovskite thereof. TiO_2, WO_3, MoO_3, ZnO, and SnO_2 are particularly preferred. Most preferably, the nano-structured film is titanium dioxide (TiO_2), and the adsorbed electrochromophore is a compound of the general formulas I-III:

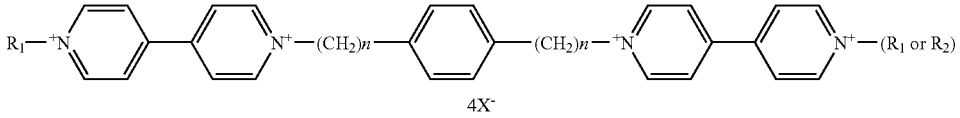
I



II



III



[0027] R_1 is selected from any of the following: