This strategy typically necessitates the touchscreen be located in front of the display, and requires that the touchscreen and display be separate, complete units. This makes for an inefficient final assembly, in that there frequently are redundant substrates in the system, adding cost and potentially decreasing display performance. The display being located behind the touchscreen from the viewer's perspective is a result not only of the assembly method, but also of the display itself. Rigid displays require touchscreens to be located in front of the display, in order to maintain the ability to sense touches to a high level of resolution. If a flexible display is used, this requirement is lessened, but only if the system is designed to accommodate a rear touchscreen by having pressure insensitive imaging materials.

[0034] An ideal system would utilize an integrated, rear touchscreen that is fabricated concurrently with the flexible display media. Such a system works best with a pressure insensitive display media, which can be fabricated such that any electrical connections are located on the outside perimeter of the media sheet. One example of such a system is a passive matrix, cholesteric display as is described in U.S. Pat. Appl. Pub. US 2004/0246411.

[0035] A preferred manufacturing method for making this display, is to begin with a flexible substrate. The flexible substrate can be any flexible self- supporting material that supports the conductor. Typical substrates can include plastics, glass, or quartz. "Plastic" means a polymer, usually made from polymeric synthetic resins, which may be combined with other ingredients, such as curatives, fillers, reinforcing agents, colorants, and plasticizers. Plastic includes thermoplastic materials and thermosetting materials.

[0036] The flexible material must have sufficient thickness and mechanical integrity so as to be self-supporting, yet should not be so thick as to be rigid. Typically, the flexible substrate is the thickest layer of the display. Consequently, the substrate determines to a large extent the mechanical and thermal stability of the fully structured display.

[0037] The flexible substrate can be polyethylene terephthalate (PET), polyethylene naphthalate (PEN), polyethersulfone (PES), polycarbonate (PC), polysulfone, a phenolic resin, an epoxy resin, polyester, polyimide, polyetherester, polyetheramide, cellulose acetate, aliphatic polyurethanes, polyacrylonitrile, polytetrafluoroethylenes, polyvinylidene fluorides, poly(methyl (x-methacrylates), an aliphatic or cyclic polyolefin, polyarylate (PAR), polyetherimide (PEI), polyethersulphone (PES), polyimide (PI), Teflon poly(perfluoro-alkoxy) fluoropolymer (PFA), poly(ether ether ketone) (PEEK), poly(ether ketone) (PEK), poly(ethylene tetrafluoroethylene)fluoropolymer (PETFE), poly(methyl methacrylate), various acrylate/methacrylate copolymers (PMMA), or a combination thereof. Aliphatic polyolefins may include high density polyethylene (HDPE), low density polyethylene (LDPE), and polypropylene, including oriented polypropylene (OPP). Cyclic polyolefins may include poly(bis(cyclopentadiene)). A preferred flexible plastic substrate is a cyclic polyolefin or a polyester. Various cyclic polyolefins are suitable for the flexible plastic substrate. Examples include Arton™ made by Japan Synthetic Rubber Co., Tokyo, Japan; Zeanor T™ made by Zeon Chemicals L.P., Tokyo Japan; and Topas™ made by Celanese A. G., Kronberg Germany. Arton™ is a poly(bis(cyclopentadiene)) condensate that is a film of a polymer. Alternatively, the flexible plastic substrate can be a polyester. A preferred polyester is an aromatic polyester such as dAryLite™ (Ferrania). Although various examples of plastic substrates are set forth above, it should be appreciated that the substrate can also be formed from other materials such as glass and quartz.

[0038] A layer of a clear conductor, such as Indium Tin Oxide (ITO), can be applied to the substrate and patterned if necessary. One example of patterning would be to use a laser system to etch the ITO, forming a series of electrically isolated columns. An active display material can be coated over some portion of the clear conductor, leaving just enough conductor exposed to make electrical contact. The display material could also be coated over the entire clear conductor, with selected portions removed in subsequent steps to expose an interconnect area. The passive matrix may then be completed by applying rows of a second conductive material onto the display material. These rows can be concurrently applied and patterned, such as would be the case with screen, inkjet, gravure, or flexographic printing methods, or it can be coated then patterned, as would be the case with laser or chemical etching. Depending on the imaging material, one of the conductive layers can be unpatterned. According to certain embodiments, only the first conductive layer may be present.

[0039] Although the embodiment described above is centered around using a polymer dispersed liquid crystal layer on a flexible polymer support, it will be understood by those practiced in the art that the display media can be any flexible, pressure insensitive, electronically updateable media. Examples of manufacturing methods for flexible, electronically updateable media include U.S. Pat. No. 6,661,563, which discloses a method of making a flexible display with microcapsules, and U.S. Pat. No. 6,933,098, which teaches roll-to-roll manufacture of electrophoretic or liquid crystal displays employing microcups.

[0040] The device can combine the media and touch sensor to form a touch sensor with visually updateable properties, or a display with touch input capability. The device can be assembled such that the media is placed between the user and the touch sensor. The media and the touchscreen can be formed as an integral unit. The components required to sense touch input can be applied directly to the display media. The touch components can be formed using the same manufacturing methods as are used in fabrication of the display, especially the display conductors. The touchscreen and media can be transparent, translucent, opaque, or a combination thereof. The touchscreen and media can be the same size or shape, or different sizes or shapes. The media and touchscreen can be completely or partially flexible. The media and touchscreen can be permanently or temporarily attached to drive electronics. The drive electronics for the media and touchscreen can be separate or integrated. Methods of forming the assembled touch sensitive device will be described with reference to the figures.

[0041] The display can be understood with reference to certain embodiments including a cholesteric liquid crystal display element, as depicted in the Figures and described below.

[0042] FIG. **1** shows a side view of a traditional touchscreen-display device as known in the art. In this embodiment, the device consists of a resistive touchscreen **30**