applied to the viewer **1** side of a rigid display plane **10**. The display plane consists of a first glass substrate **12**, an active display layer **21**, and a second glass substrate **12**. The glass substrates are held at a specific distance from one another in any of a variety of ways, including, but not limited to, spacer beads, embedded fibers, polymer layers, or microfeatures. In the case when a touchscreen is to be added to the system, it is typically made as a separate assembly and attached to the display plane in subsequent steps. The resultant assembly is non-optimum because it has redundant substrates and, in most cases, an additional adhesive layer to adhere the touchscreen to the display. A resistive touchscreen **30** typically consists of a flexible, transparent, first substrate **41**, a transparent first electrode **31**, transparent spacers **42**, sensing electrodes **33**, a transparent second electrode **32**, and a transparent, second substrate **44**. The electrodes are typically indium tin oxide (ITO) sputter coated onto the substrate. The purpose of the spacers **42** is to keep the electrodes **31**, **32** separated by an air gap **43**. The reason for this will be explained with regard to FIG. **2**.

[0043] Although the embodiment shown in FIG. **1** is a resistive touchscreen, a capacitive touchscreen could also be used. Capacitive touchscreens are similar to resistive touchscreens, except they consist of only a single electrode and substrate, with sensing electrodes located in the four corners of the assembly. The electrode for a capacitive touchscreen is typically located such to expose it to the viewer.

[0044] FIG. **2** shows a side view of a traditional, resistive touchscreen-display device as known in the art, with the touchscreen activated. An input device **2**, such as a stylus or finger, applies pressure to the first substrate of the touchscreen **41**, causing the substrate and first electrode **31** to deflect until the first electrode **31** comes into contact with the second electrode **32**. As both electrodes **31**, **32** are held at a given voltage, contact between them generates a current. The touchscreen sensing electrodes **33** measure the current generated and calculate the location of the touch, by extrapolating distance from the sensor **33** from a calculation using the sheet resistance of the first and second electrode **31**, **32** materials. In this embodiment, the display **10** is not flexed, and the touchscreen **30** must be at least partially transparent for the display image to be viewed.

[0045] In the case that a capacitive touchscreen is used, sensing is done in a slightly different manner. In the capacitive system, the electrode surface is held at a specific voltage. When a conductive input device with some intrinsic capacitance contacts the electrode, the capacitor charges, causing current to flow. The sensors arrayed around the electrode measure this current flow, and calculate the position of the contact. The advantage to this system over the resistive method is that only one electrode and one substrate are required. The disadvantages are that the input device must be conductive and there are a very limited number of protective materials that can be placed over the electrode without interfering with touch input. Additionally, the electronics required to measure the touch are typically more complex than those used in a resistive system.

[0046] FIG. **3** shows an alternative system, in which a flexible display **10** is formed with an integral resistive touchscreen **30**. The display can be is formed as was described previously, with a first display substrate **10**, and an active display layer **21**, consisting of a layer of display material coated between two electrode layers. The display can be given touch sensitive capability by adding a first touchscreen electrode **31**, spacers **42**, a second touchscreen electrode **32**, optional touch sensing electrodes **33**, and a second touchscreen substrate **44**. An insulating layer (not shown) may have to be placed between the second display electrode **26** and the first touchscreen electrode **31** to prevent electrical interference or shorting. In this embodiment, the display substrate acts as the first touchscreen substrate, optimizing the assembly such that only two substrates are required. This is a significant improvement over the traditional touchscreen display, which required four substrates and an adhesive layer to complete the assembly. Methods for fabricating the individual layers will be described with regard to FIG. **5**.

[0047] FIG. **4** illustrates an additional refinement, in which the system can be further optimized to combine the second display electrode and the first touchscreen electrode. Certain configurations of resistive or capacitive touchscreens could use contact of the second display electrode **26** to the second touchscreen electrode **32** to register a touch position. This configuration allows the spacers **42** to be applied directly to the second display electrode.

[0048] FIG. **5** shows an exploded isometric view of one embodiment of the touch-sensing display assembly. For reference, in this embodiment, the viewer would look through the first display substrate **11**. However, if all layers are transparent, viewing could be through second touchscreen substrate **44**. For some passive matrix systems, the display portion of the assembly can consist of the display substrate **11**, the first display electrode **25**, the display imaging layer **22**, and the second display electrode **26**. For some active matrix structures, the first and second display electrodes can be replaced with an active matrix, thin film transistor (TFT) layer. The display portion of the system can utilize in-plane switching, in which only the second conductive layer is used. The portion of the display that is to become touch sensitive should be flexible and somewhat pressure insensitive. Methods for forming the display may vary greatly depending on the display technology.

[0049] Once the display is formed, the touch sensitive components can be added. In this embodiment, a resistive system is shown. The structure begins with an insulating layer **34**, which is applied to everything except the electrical contact areas required to drive the display. For the remainder of this description, it can be assumed that subsequent layers do not cover the display electrode electrical interconnects, and that the term "entire touchscreen area" refers only to the portion or portions of the assembly that are to be made touch-sensitive. The insulation layer is only required if the display portion of the assembly terminates in a conductive layer. The insulation layer **34** can be applied by screen printing, coating, lamination, vacuum deposition, ink jetting, stamping, or any other known method of application.

[0050] The first touchscreen electrode **31** is then applied. In a resistive system, this is a continuous conductive layer, which can be applied to the entire touchscreen area through screen printing, coating, vacuum deposition, ink jetting, gravure printing, or other methods.

[0051] The next layers include the spacers **42** and any sensing electrodes **33** required for the specific touch sensing method. For resistive touchscreens, the sensing electrodes