[0355] The mixture is then coated onto the PVA coated glass bottom substrate **120** with the use of a knife coater. The coating is preferably about 8-12 microns thick. The coating temperature and the gap of the knife coater can be used to vary the thickness of the coating as applied.

[0356] The mixture is then laminated with the PET top substrate **122** using a laminator. The temperature and the gap between the rollers of the laminator will effect the final thickness of the film.

[0357] To make a CLC film with red, green sub-pixel **121**, red sub-pixel **127** and clear sub-pixel **124** in layer **125**, layer **125** is heated at 75° C. with the PET substrate **122** up, the heating is preferably done on a hot plate.

[0358] With the layer **125** at 75° C. it is preferably mechanically sheared to align the liquid crystal molecules. Mechanical shearing provides a tangential mechanical force which helps align the liquid crystal molecules between substrates **120** and **122** in layer **125**.

[0359] With layer **125** still on the hot plate or still heated to 75° C., apply a mask to the top substrate layer **122** having the PET material. The mask is applied to block the sub-pixels of the layer **125** to be the red, green sub-pixel **121** and the clear sub-pixel **124** leaving exposed the red sub-pixel **127**.

[0360] While still at 75° C. layer **125** is then exposed to UV light of 360 nm at 0.1 mW/cm^2 intensity for approximately 20 seconds to polymerize the exposed cholesteric liquid crystals in the red sub-pixel **127** of layer **125**.

[0361] While still at 75° C. layer **125** is further exposed by a collimated UV of about 360 nm at another intensity of about 10 mW/cm^2 for about 30 seconds.

[0362] While still at 75° C. the mask blocking the red, green sub-pixel **121** is moved and layer **125** is exposed to UV light 360 nm at 0.1 mW/cm^2 for approximately 40 seconds to polymerize the red, green sub-pixel **121** of layer **125** with the desired bandwidth.

[0363] While still at 75° C. layer **125** is further exposed by a collimated UV of about 360 nm at another intensity of about 10 mW/cm^2 for about 30 seconds.

[0364] The mask is then totally removed exposing all of layer **125**.

[0365] The temperature is raised to 150° C. to polymerize the clear isotropic phase **124**.

[0366] Maintaining 150° C. layer **125** is then exposed to UV light of 360 nm at 20 mW/cm^2 for approximately 30 seconds to set the polymers The PET substrate **122** is then removed. Layer **125** is now ready for installation in a display or for other use.

[0367] As shown in **FIG. 4** layers **115** and **125** can be installed in a display device by using UV curable adhesives as with the layers **15** and **25** of **FIG. 2**.

[0368] Similarly as shown in **FIG. 27** right handed and left handed layers **30**, **20** and **35**, **25** from **FIG. 5**B1 can also be used to produce colored light from both polarized and/or unpolarized white light **201**.

[0369] **FIG. 15** shows another embodiment of the method for patterning the color filter in each layer associated with **FIG. 11** and **13**. Instead of patterning "green, blue", "clear", and "blue" ("B,G", "clear", "B") as in layer **70** of **FIG. 4**, it can be patterned into "Clear", "B", "B", "Clear", "G,B", "G,B", "Clear". Similarly, layer **60** can be patterned to be "R,G", "R", "R", "R,G", "Clear", "Clear", "R,G", "R", "R", where "R", "G" and "B" refer to the filter layer portion reflecting blue and red light, respectively and Clr refers to a clear portion of the layer. If the two layers are aligned in the way as shown in **FIG. 17**, color filter pixels consist of sub-pixels (R_t, B_t, G_t) and (G_t, B_t, R_t) will be formed, where "R_t", "G_t", and "B_t" refer to the red, green, and blue sub-pixels in transmission. In this manner the blue B, green, blue G,B, red(R) and clear Clr sub-pixels are doubled up such that one large sub-pixel takes the place of two smaller ones providing a n easier fabrication process. Using the same scheme as suggested in **FIG. 5, a** black matrix will be automatically formed in this color filter structure when overlapping reflective portions reflecting all colors are used. Pixels in a display having three sub-pixels one for each of the primary colors of red, green, and blue being transmitted are shown above in **FIG. 5**B1.

[0370] Pixels in a display may also have four sub-pixels one for each of the primary colors red, green, and blue and one for transmitting white light, shown as a clear sub-pixel in **FIGS. 11, 13** and **14** through **24**D. Again, the clear pixel can be made from the same material in a clear isotropic state or, this clear sub-pixel can be made to reflect light in the infrared or ultraviolet bands and transmit the visible light.

[0371] As shown above for three sub-pixel arrays of pixels made up of two layers of reflective color filters, the sub-pixels can be arranged to make 2 or more adjacent sub-pixels in a layer the same color for ease of manufacture. Sub-pixels of one color can then be made 2 times or even 4 times as large as one sub-pixel.

[0372] With four sub-pixels per pixel the number of combinations of sub-pixel patterns is much larger than with three sub-pixels. The object is to find combinations for the two layers of reflective color filters making up the arrays of the display with the largest possible number of adjacent sub-pixels having the same color for ease of manufacturing the displays. The pixels in the four sub-pixel display will have 24 combinations of sub-pixels per pixel. If the pixel sizes are small enough the human eye will not be able to detect that the sub-pixels are in different places for adjacent pixels. Therefore pixels which are mirror images of each other may be used where the sub-pixels will then have adjacent colors for ease of manufacture.

[0373] In **FIG. 16A, a** two-layer color filter system is shown. **FIG. 16B** is the top layer, **FIG. 16C** is the bottom layer and **FIG. 16D** is the transmissive color pixel pattern. In the figure, "GR" means that the pixel reflects in green and red; "GB" means that the pixel reflects in green and blue; "B" means that the pixel reflects in blue; "R" means that the pixel reflects in red, and "Clr" means that the pixel is transparent in the visible. However, it can reflect infrared and/or ultraviolet light. When the two layers are aligned and laminated to each other, a color filter is generated with a transmission color configuration as shown in **FIG. 8**D2.

[0374] In the pixel pattern of **FIG. 16**B, the top layer of the highlighted pixel has a pixel array wherein the sub-pixel pattern in the top row has from left to right green, blue GB and blue(B) the bottom row has green, red GR and Clear Clr.