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.

[0282] The mixture is then laminated with the PET top substrate **212** using a laminator. The temperature and the gap between the rollers of the laminator will effect the final thickness of the film.

[0283] To make a CLC film with blue sub-pixel **217** and green sub-pixel **218** in layer **102**, layer **102** is heated at 100° C. with the PET substrate **212** up, the heating is preferably done on a hot plate.

[0284] With the layer **102** at 100° C. it is preferable to mechanically shear the top substrate **212** downward with respect to the bottom substrate **210**. The mechanical shearing provides a tangential mechanical force which helps align the liquid crystal molecules between substrates **210** and **212** in layer **102**.

[0285] With layer **215** still on the hot plate or still heated to 100° C., apply a mask to the top substrate layer **212** having the PET material.

[0286] The mask will vary in size and shape depending on the use of the layer. For use in color displays the mask will be the size and shape of pixels used in the display. In the layer shown in **FIG. 8A** the CLC-based filter **10**A uses two layers with two reflection colors per layer. The pixel sizes may vary in size within the layer. For example as two sub-pixels of blue **217** are used side by side only one large sub-pixel needs to be made, however two sub-pixels may also be used in the same space for the blue sub-pixel portion **217** in layer **102**.

[0287] A mask is applied to block the portion of layer **102** to be the green sub-pixel **218** leaving blue sub-pixels **217** exposed.

[0288] While still at 100° C. layer **102** is exposed to UV light of about (360 nm) at 2.77 mW/cm^2 intensity for approximately 17 seconds to polymerize the exposed cholesteric liquid crystals in the blue sub-pixels **217** of layer **102**.

[0289] Layer **102** is then heated at 61° C. preferably on a hot plate for about 5 minutes to control broadening of the bandwidth of the blue sub-pixel **217** of layer **104**. The bandwidth is a function of the pitch gradient of the cholesteric liquid crystal material.

[0290] While at 61° C. the mask is removed and layer **15** is exposed to UV light of about 360 nm at 1.00 mW/cm^2 for approximately 150 seconds to polymerize the green sub-pixel **218** of layer **102** with the desired bandwidth.

[0291] Maintaining 61° C. layer **102** is then exposed to UV light of 360 nm at 20 mW/cm^2 for approximately 60 seconds to set the polymers of both the blue sub-pixels **217** and the green sub-pixel **218**. The PET substrate **212** is then removed. Layer **102** is now ready for installation in a display or for other use.

[0292] To make left handed reflective cholesteric liquid crystal (CLC) color filter reflecting the green sub-pixel **227** and red sub-pixels **228** of layer **104**, first, prepare a bottom substrate **220** of PVA (polyvinyl alcohol) coated glass, by buffing it in one direction. Then, prepare a top substrate **221** of PET (Mylar D) by buffing it in any direction.

[0293] Mix a left handed CLC polymer comprising blue polysiloxane, such as that sold by Wacker Chemical Company of Germany as SLM90032, 79% by weight, with a low molecular weight nematic liquid crystal, such as that sold by EMI Company of Germany as (E44, EMI): 20% by weight. Then add a photo initiator (IG184, Ciba-Geigy), 1% of the CLC polymer SLM90032. The above materials are mixed at 120° C. and de-gassed in a vacuum for 20 minutes at 90° C.

[0294] The mixture is then coated onto the PVA coated glass bottom substrate **220** 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. The mixture is then laminated with the PET top substrate **221** using a laminator. The temperature and the gap between the rollers of the laminator will effect the final thickness of the film.

[0295] To make a CLC film with red **228** and green **227** sub-pixels in layer **104**, layer **104** is heated to 58° C. with the PET substrate **220** up, the heating is preferably done on a hot plate.

[0296] With the layer **104** at 58° C. it is preferably mechanically sheared to make the liquid crystal molecules aligned. The mechanical shearing provides a tangential mechanical force which helps align the liquid crystal molecules between substrates **220** and **221** in layer **104**. With layer **104** still on the hot plate or still heated to 58° C., apply a mask to the top substrate layer **221** having the PET material. The mask will vary in size and shape depending on the use of the layer. For use in color displays the mask will be the size and shape of pixels used in the display. In the layer shown in **FIG. 8A** the CLC-based spectral filter **10**A uses two layers with two colors of reflective color filters per layer.

[0297] The pixel sizes may therefore vary in size within the layer. For example as two sub-pixels of red are used side by side only one large sub-pixel need be made, however two sub-pixels may also be used in the same space for the red sub-pixel **227** in layer **104**.

[0298] The mask is applied to block the portion of the layer **104** to be the green sub-pixel **227** leaving exposed red sub-pixels **228**.

[0299] While still at 58° C. layer **25** is then exposed to UV light of 360 nm at 1.0 mW/cm^2 intensity for approximately 77 seconds to polymerize the exposed cholesteric liquid crystals in the red sub-pixel **228** of layer **104**.

[0300] Layer **104** is then heated at 83° C. preferably on a hot plate for about 5 minutes to control broadening of the bandwidth of the red sub-pixel **228** of layer **104**.

[0301] The mask is then removed and layer **104** is held at 70° C. while layer **104** is exposed to UV light 360 nm at 20 mW/cm^2 for approximately 60 seconds to polymerize the green sub-pixel **227** of layer **104** with the desired bandwidth.

[0302] The PET substrate **22** is then removed. Layer **104** is now ready for installation in a display or for other use.

[0303] As shown in **FIG. 8B** the layers **102** and **104** can be laminated together to form a two layer color filter for a display.

[0304] In order to make a display, layer **104** is glued to a reflective matrix substrate **101** preferably by using a UV