INTEGRATED QUANTUM DOT OPTICAL CONSTRUCTIONS

FIELD

The disclosure relates to integrated quantum dot optical constructions and, in particular, to integrated quantum dot optical constructions including a low refractive index element.

BACKGROUND

Liquid crystal displays (LCDs) are non-emissive displays that utilize a separate backlight unit and red, green, and blue color filters for pixels to display a color image on a screen. The red, green, and blue color filters each transmit light within a narrow wavelength band and absorb all other visible wavelengths, resulting in significant optical loss. The red, green, and blue color filters each transmit only light of a specific wavelength, resulting in significant optical loss. Thus, a high luminance backlight unit is needed to produce an image with sufficient luminance.

BRIEF SUMMARY

The disclosure relates to integrated quantum dot optical constructions and, in particular, to integrated quantum dot optical constructions including a low refractive index element. The disclosure also relates to quantum dot optical constructions to increase color gamut of LCD displays.

In many embodiments an optical construction includes a quantum dot film element including a plurality of quantum dots, a first optical recycling element, and a first low refractive index element separating the quantum dot film element from the first optical recycling element. The first low refractive index element has a refractive index of 1.3 or less.

In further embodiments an optical construction includes a quantum dot film element including a plurality of quantum dots, a light reflecting element, and a first low refractive index element separating the quantum dot film element from the light reflecting element. The first low refractive index element has a refractive index of 1.25 or less.

In further embodiments, an optical construction includes a quantum dot film element including a plurality of quantum dot, a display panel, and a first low refractive index element separating the the quantum dot film element from the display panel. The first low refractive index element has a refractive index of 1.25 or less.

The details of one or more embodiments of the disclosure are set forth in the accompanying drawings and the description below. Other features, objects, and advantages of the disclosure will be apparent from the description and drawings, and from the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The disclosure may be more completely understood in consideration of the following detailed description of various embodiments of the disclosure in connection with the accompanying drawings, in which:

FIG. 1 is a schematic cross-sectional view of an illustrative integrated quantum dot construction;

FIG. 2 is a schematic cross-sectional view of an illustrative integrated quantum dot construction on a display panel;