[0024]

In still another aspect of the antireflection film according to the present invention, a dimension when viewed from the top of the protrusion is preferably 40 μm or less especially. For example, the dimension when viewed from the top is preferably about 20 μm.

[0025]

In still another aspect of the antireflection film according to the present invention, intervals between the protrusions are preferably 200 μm or more.

[0026]

In still another aspect of the antireflection film according to the present invention, a density at which the protrusions are arranged is preferably about 1%.

[0027]

In still another aspect of the antireflection film according to the present invention, the height of the protrusion is preferably 2 μm or more. When the height of the protrusion is smaller than 2 μm, even though the antireflection ~~sheet~~ film is not pressed, interference fringes disadvantageously occur between the antireflection film and a surface of a member such as a liquid crystal panel facing the antireflection film.

[0028]

Furthermore, a density of the protrusions per unit area is preferably 1% or more. The protrusions for protecting an antireflection structure must support the antireflection film while withstanding a predetermined load. For this purpose, the protrusions need occupy an area that is at least 1% of the area of the antireflection film. When the density of the protrusions decreases, a region between the protrusions may be bent to bring the protrusions into contact with the facing member. For this reason, the intervals between the protrusions are not excessively widened. For this purpose, the protecting pillars are required to have a density of 1% or more.

[0029]

In still another aspect of the antireflection film according to the present invention, when the antireflection film is used while

being superposed on a liquid crystal panel, an alignment direction of the protrusions may be inclined with respect to an alignment direction of the liquid crystal panel. According to the aspect, even though an alignment pitch of the protrusions on the antireflection film is almost equal to a pixel pitch of the liquid crystal panel, Moire fringes do not easily occur.

[0030]

In still another aspect of the antireflection film according to the present invention, the antireflection film can be arranged between, for example, an information display module and a cover panel or a touch panel module. In this manner, the screen of a display device can be prevented from being hard to be seen due to reflection of sunlight or illumination lighting.

[0031]

A means for solving the problem in the present invention has characteristics obtained by arbitrarily combining the constituent elements described above. The present invention enables a large number of variations obtained by combining the constituent elements.

BRIEF DESCRIPTION OF THE DRAWINGS

[0032]

[Fig. 1] Fig. 1A is a schematic sectional views of a display device in which an antireflection film is not arranged. Fig. 1B is a schematic sectional view of a display device using one antireflection film. Fig. 1C is a schematic sectional view of a display device using two antireflection films.

[Fig. 2] Fig. 2A is a diagram showing light entering an antireflection film in front-surface incidence. Fig. 2B is a micrograph showing a manner of a front surface of antireflection film which light enters in front-surface incidence. Fig. 2C is a diagram showing light entering the antireflection film in rear-surface incidence. Fig. 2D is a micrograph showing a manner of a rear surface of the antireflection film which light enters in rear-surface incidence.

[Fig. 3] Fig. 3 is a pattern diagram showing a manner in which regressive reflection is caused by protective pillars in rear-surface ~~reflection~~ incidence on a conventional antireflection film.

[Fig. 4] Fig. 4A is a schematic view showing a state in which, in a conventional antireflection film, when a part of the antireflection film is pressed to flatten a protective pillar between the antireflection film and a facing member. Fig. 4B is a graph showing a change in chromaticity corresponding to Fig. 4A.

[Fig. 5] Fig. 5 is a partially enlarged perspective view showing an antireflection film according to the first embodiment of the present invention.

[Fig. 6] Fig. 6 is a schematic view showing a section passing through the central axis of one protective pillar.

[Fig. 7] Fig. 7 is a diagram showing a relationship between the diameter of a protective pillar and the intensity of regressive reflection caused by the protective pillar.

[Fig. 8] Fig. 8 is a diagram for explaining a protective pillar having a curved sectional shape.

[Fig. 9] Fig. 9 is a partially enlarged perspective view showing an antireflection film according to a second embodiment of the present invention.

[Fig. 10] Fig. 10A is a schematic view showing a state in which, in the antireflection film according to the first embodiment of the present invention, a part of the antireflection film is pressed to depress a protective pillar between the antireflection film and a facing member. Fig. 10B is a graph showing a change in chromaticity corresponding to Fig. 10A.

[Fig. 11] Figs. 11A, 11B, and 11C show manners obtained when parts of antireflection films in which intervals between protective pillars are changed to 50 μm, 200 μm, and 500 μm, respectively are pressed.

[Fig. 12] Figs. 12A, 12B, and 12C show manners obtained when parts of antireflection films in which diameters of protective pillars are changed to 20 μm, 40 μm, and 60 μm, respectively are pressed.

[Fig. 13] Figs. 13A, 13B, and 13C are schematic views for explaining a handling method of an antireflection ~~sheet~~ film.

[Fig. 14] Fig. 14 is a diagram for explaining each arrangement of an antireflection film and an image display panel.

[Fig. 15] Fig. 15A is a diagram showing a manner in which an

7. The antireflection film according to claim 3, wherein a density at which the protrusions are arranged is about 1%.

8. The antireflection film according to claim 1 or 3, wherein a height of each of the protrusions is 2 μm or more.

9. The ~~contact prevention~~ antireflection film according to claim 8, wherein a density of the protrusion per unit area is 1% or more.

10. The antireflection film according to claim 1 or 3, wherein when the antireflection film is used to be superposed on a liquid crystal panel, an alignment direction of the protrusions is inclined with reference to an alignment direction of pixels of the liquid crystal panel.

11. The antireflection film according to claim 1 or 3, wherein the antireflection film is arranged between an information display module and a cover panel or a touch panel module.