POLYMERIC MULTILAYER OPTICAL FILM

Background

Polymeric multilayer optical films are formed by coextruding tens to hundreds of molten polymer layers and subsequently orienting or stretching the resulting film. These microlayers have different refractive index characteristics and sufficient thinness so that light is reflected at interfaces between adjacent microlayers.

Summary

~~In one aspect, t~~The present disclosure relates to polymeric multilayer optical films. More particularly, the present disclosure relates to polymeric multilayer optical films having a first optical packet and a second optical packet disposed on the first optical packet. The first optical packet includes a group of optical layers that reflects blue light. The first optical packet is configured such that the group of optical layers that reflects blue light is nearer to the second optical packet than to the outer layers of the polymeric multilayer optical film. The polymeric multilayer optical film reflects more than about 95% of light from 400 nm to 700 nm at normal incidence. ~~In some embodiments t~~The group of layers that reflects blue light may includes the thinnest layer of the first optical packet.

In ~~another~~ one aspect, the present ~~disclosure relates to~~invention provides a polymeric multilayer optical film having a first optical packet having a substantially linear layer profile with a negative slope, where a group of layers proximate an external side of the first optical packet reflects red light and a second optical packet, disposed on the first optical packet. The polymeric multilayer optical film reflects more than about 95% of light from 400 nm to 700 nm at normal incidence. In some embodiments the group of layers that reflects red light includes the thickest optical layer of the first optical packet. In some embodiments the group of layers that reflects red light are adjacent to the external side of the first optical packet.

~~In yet another aspect, t~~The present disclosure also relates to a polymeric multilayer optical film having a first optical packet having a first group of layers proximate a first side of the first optical packet reflecting substantially red light and a second group of layers proximate a second side of the first optical packet reflecting substantially blue light, and a second packet disposed on the first optical packet. The first optical packet is configured such that the second group of layers is disposed between the first group of layers and the second optical packet. The polymeric multilayer optical film reflects more than about 95% of light from 400 nm to 700 nm at normal incidence. ~~In some embodiments, t~~The first group of the first optical packet ~~is~~ may be adjacent the first

side of the first optical packet. ~~In some embodiments, t~~The second group of the first optical packet ~~is~~ may be adjacent the second side of the first optical packet.

~~In another aspect, t~~The present disclosure also relates to a polymeric multilayer optical film having a first optical packet and a second optical packet disposed on the first optical packet. The thinnest optical layer of the polymeric multilayer optical film is substantially in the middle of the polymeric multilayer optical film and the polymeric multilayer optical film reflects more than about 95% of light from 400 nm to 700 nm at normal incidence. ~~In some embodiments, t~~The polymeric multilayer optical film ~~is~~ may be thinner than 100 μm, 85 μm, or 65, μm. ~~In some embodiments, t~~The polymeric multilayer optical film may includes a third optical packet disposed on the second optical packet, and in some embodiments that polymeric multilayer optical film is thinner than 165 μm. ~~In some embodiments, t~~The polymeric multilayer optical film may includes an anti-wetout layer. ~~In some embodiments, t~~The polymeric multilayer optical film may reflects more than 99% of light from 400 nm to 700 nm at normal incidence.

Brief Description of the Drawings

FIG. 1 is a schematic perspective view of a multilayer optical film.

FIG. 2 is a graph showing calculated versus measured hemispheric reflectivity for a multilayer polymeric reflective film.

FIG. 3 is a graph showing the layer profile of the multilayer film of Comparative Example C1.

FIG. 4 is a graph showing hemispheric reflectivity spectra of the multilayer film of Comparative Example C1.

FIG. 5 is a graph showing the layer profile of the multilayer film of Example 1.

FIG. 6 is a graph showing hemispheric reflectivity spectra of the multilayer film of Example 1.

FIG. 7 is a graph showing the layer profile of the multilayer film of Example 2.

FIG. 8 is a graph showing hemispheric reflectivity spectra of the multilayer film of Example 2.

FIG. 9 is a graph showing the layer profile of the multilayer film of Comparative Example C2.

FIG. 10 is a graph showing the hemispheric reflectivity spectra of the multilayer film of Comparative Example C2.

Detailed Description

Multilayer optical films, i.e., films that provide desirable transmission and/or reflection properties at least partially by an arrangement of microlayers of differing refractive index, are known. It has been known to make such multilayer optical films by depositing a sequence of inorganic materials in optically thin layers ("microlayers") on a substrate in a vacuum chamber.