DAYLIGHT REDIRECTING GLAZING LAMINATES

The present application claims priority from U.S. Provisional Application No. 61/830,048, filed on May 31, 2013, which is incorporated in its entirety herein by reference.

Field of the Disclosure

This disclosure relates generally to light management constructions, specifically to light redirecting constructions, such as constructions comprising solar light redirecting layers and glazing units.

Background

A variety of approaches are used to reduce energy consumption in buildings. Among the approaches being considered and applied is the more efficient use of sunlight to provide lighting inside buildings. One technique for supplying light inside of buildings, such as in offices, etc. is the redirection of incoming sunlight. Because sunlight enters windows at a downward angle, much of this light is not useful in illuminating a room. However, if the incoming downward light rays can be redirected upward such that they strike the ceiling, the light can be more usefully employed in lighting the room.

In general, conventional safety glazing is formed from a laminate made of two rigid layers, typically glass, and an anti-lacerative mechanical energy absorbing interlayer, such as, for example, plasticized polyvinyl butyral (PVB). Typically, the glazing is prepared by placing the PVB layer between glass sheets, eliminating air from the engaging surfaces, and then subjecting the assembly to elevated temperature and pressure in an autoclave to fusion-bond the PVB and glass into an optically-clear structure. The glazing may then be used in buildings, or the windows, windshields, or rear glass of a motor vehicle.

Summary

Microstructured films are used to redirect sunlight to provide illumination within a room. Microstructured films are typically adhered to glass substrates with a pressure sensitive adhesive. When microstructured films are adhered to the glass with the structured surface exposed they are susceptible to mechanical damage in use. The optical properties of the microstructured films may be altered if scratched or otherwise damaged. The present disclosure provides microstructured films laminated between glazing panes that retain light-redirecting properties and methods of preparing such microstructured films.

An aspect of the present invention provides a light redirecting construction comprising the following elements in the recited order:

a first glazing substrate;

a first interlayer adjacent the first glazing substrate;

a light redirecting film adjacent to the first interlayer, wherein the light directing film comprises ~~comprising~~ at least one microstructure surface; and

a second glazing substrate adjacent to the light directing film, ~~and~~

~~a first interlayer adjacent the first glazing substrate to both the light redirecting film and the second glazing substrate;~~

wherein the light redirecting film has an area smaller than the area of the first interlayer, and wherein the first interlayer bonds the first glazing substrate to both the light directing film and the second glazing substrate.

Claims:

1. A light redirecting construction comprising the following elements in the recited order:
   - a first glazing substrate;
   - a first interlayer adjacent the first glazing substrate;
   - a light redirecting film adjacent to the first interlayer, wherein the light directing film comprises ~~comprising~~ at least one microstructure surface; and
   - a second glazing substrate adjacent to the light directing film, ~~and~~
   - ~~a first interlayer adjacent the first glazing substrate to both the light redirecting film and the second glazing substrate;~~

   wherein the light redirecting film has an area smaller than the area of the first interlayer, and wherein the first interlayer bonds the first glazing substrate to both the light directing film and the second glazing substrate.

2. The light redirecting construction according to claim 1, wherein the light redirecting construction is a laminate.

3. The light redirecting construction according to any of the preceding claims, wherein the light redirecting film is positioned in the light redirecting construction so that the side of the light redirecting film having the at least one microstructure surface is facing the second glazing substrate.

4. The light redirecting construction according to any of the preceding claims, wherein the light redirecting film is positioned in the light redirecting construction so that the side of the light redirecting film having the at least one microstructure surface is facing the second glazing substrate; and

wherein the light redirecting construction further comprises an optical film located between the light redirecting film and the second glazing substrate.

5. The light redirecting construction according to any of the preceding claims, wherein the light redirecting film is positioned in the light redirecting construction so that the side of the light redirecting film having the at least one microstructure surface is facing the second glazing substrate and further comprises aerogel in the volume defined by the at least one microstructure surface and the second glazing substrate.

6. The light redirecting construction according to any of the preceding claims, further comprising a diffusing film.

7. The light redirecting construction according to any of the preceding claims, further comprising a third glazing substrate bonded to the second glazing substrate by a second interlayer.

8. The light redirecting construction according to any of the preceding claims, further comprising a third glazing substrate, wherein the third glazing substrate is not bonded to the second glazing substrate~~, and is located a distance L1 from the second glazing substrate~~.