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Vasylyev

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(54) **LIGHT TRAPPING OPTICAL STRUCTURE**

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Related U.S. Application Data

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H01L 31/00 (2006.01)
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H01L 31/054 (2014.01)
H02S 40/22 (2014.01)
G02B 3/00 (2006.01)
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CPC **G02B 19/0028** (2013.01); **H01L 31/054** (2014.12); **H01L 31/0543** (2014.12); **H01L 31/0547** (2014.12); **H02S 40/22** (2014.12); **G02B 3/005** (2013.01); **G02B 3/0056** (2013.01); **G02B 19/0004** (2013.01); **H02S 40/00** (2013.01); **Y02E 10/52** (2013.01)

(58) **Field of Classification Search**

CPC ... **G02B 19/0028**; **H02S 40/22**; **H01L 31/054**; **H01L 31/0543**; **H01L 31/0547**; **Y02E 10/52**

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See application file for complete search history.

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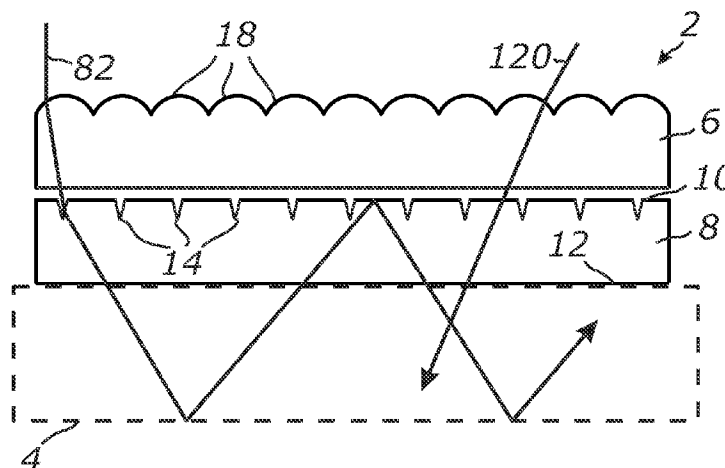
Primary Examiner — Robert Tavlykaev

(57)

ABSTRACT

A light trapping optical cover employing an optically transparent layer with a plurality of light deflecting elements. The transparent layer is configured for an unimpeded light passage through its body and has a broad light input surface and an opposing broad light output surface. The light deflecting elements deflect light incident into the transparent layer at a sufficiently high bend angle with respect to a surface normal and direct the deflected light toward a light harvesting device adjacent to the light output surface. The deflected light is retained by means of at least TIR in the system formed by the optical cover and the light harvesting device which allows for longer light propagation paths through the photoabsorptive layer of the device and for an improved light absorption. The optical cover may further employ a focusing array of light collectors being pairwise associated with the respective light deflecting elements.

19 Claims, 11 Drawing Sheets



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Related U.S. Application Data

- (60) Provisional application No. 61/214,331, filed on Apr. 21, 2009, provisional application No. 61/461,522, filed on Jan. 18, 2011.

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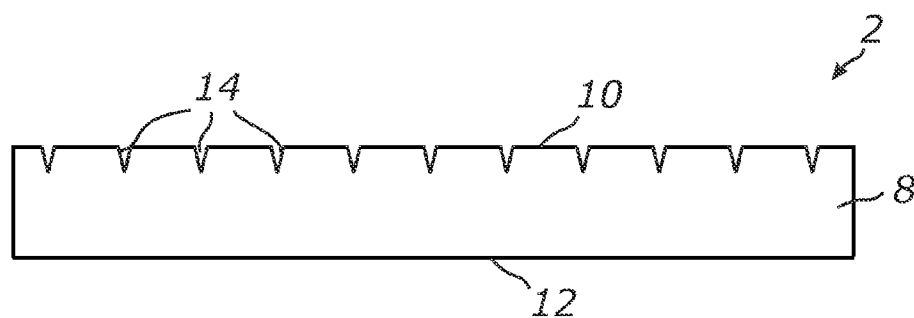


FIG. 1

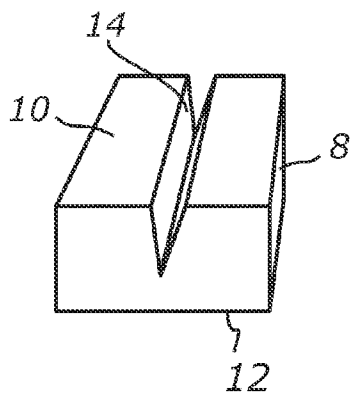


FIG. 2

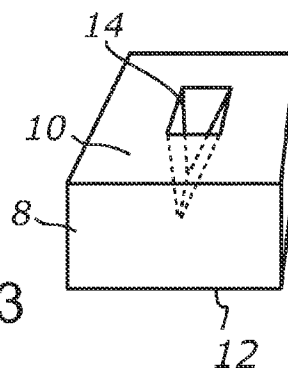


FIG. 3

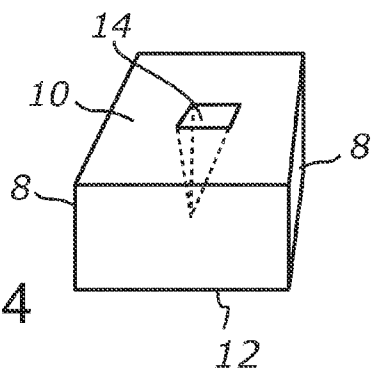


FIG. 4

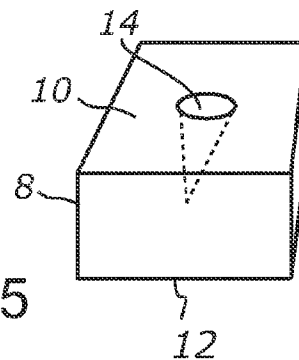
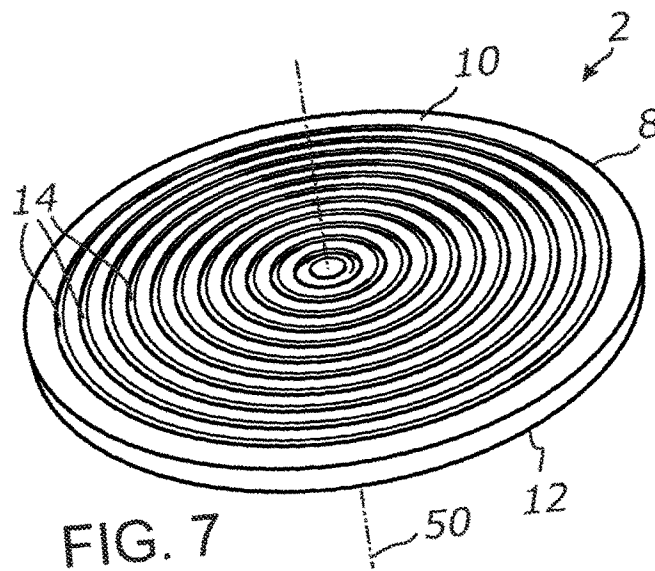
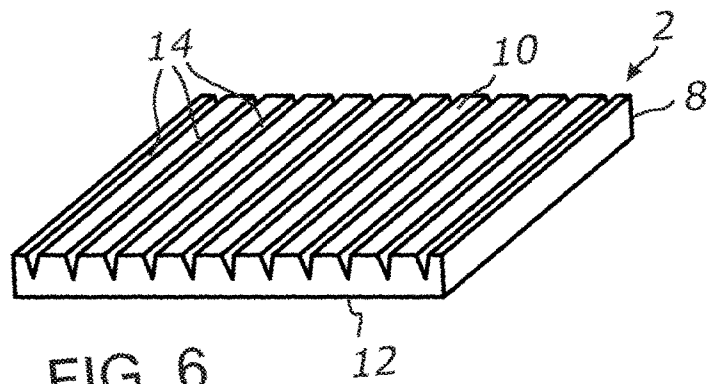
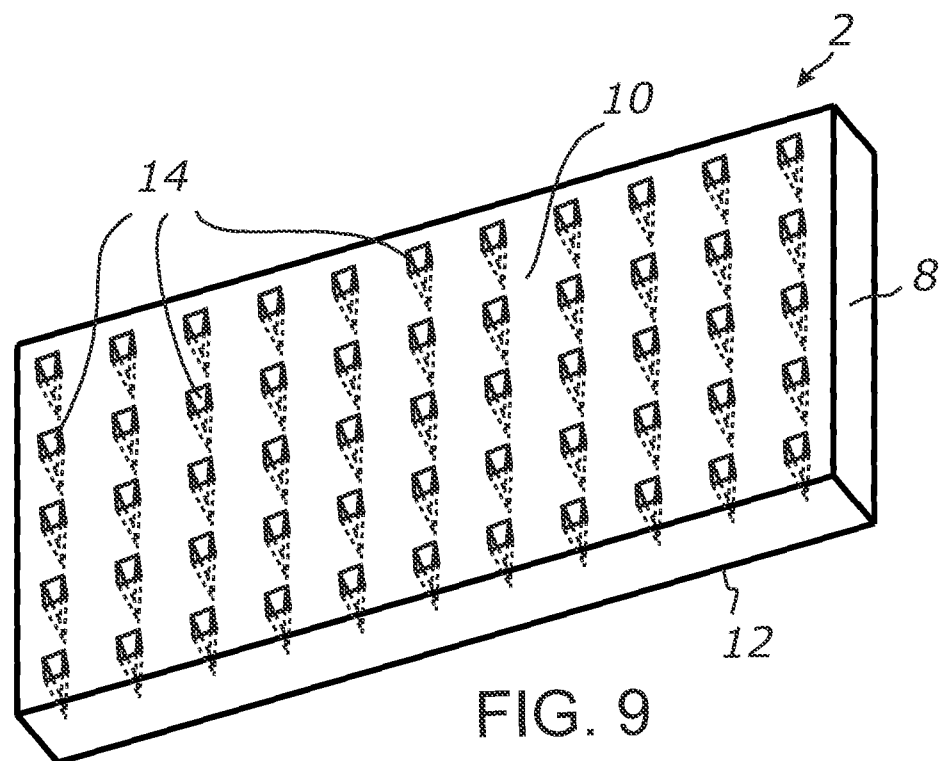
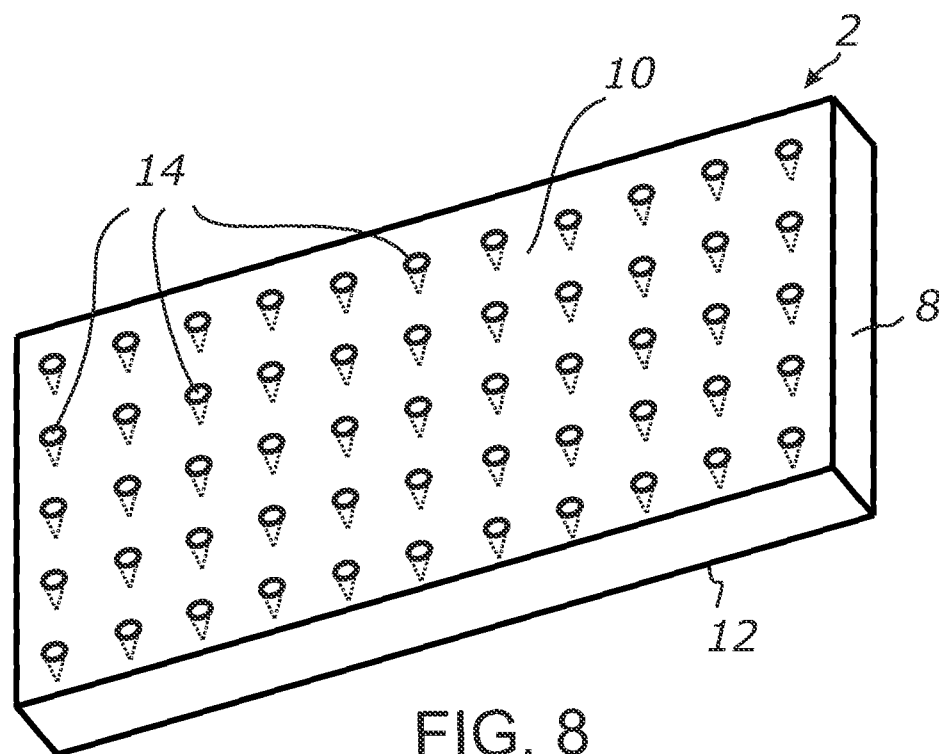


FIG. 5







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