

Out-coupling efficiency enhancement for OLED lighting applications by enlarging micro-lens array

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The purpose of this study is to demonstrate a method to increase the out-coupling efficiency enhancement, and the illumination area. According to our simulations, we discovered that enlarging the size of micro-lens array can further enhance the out-coupling efficiency, as well as the illumination area. Moreover, with a single macro-lens, as large as expand the length of the substrate, the out-coupling efficiency enhancement ratio can be improved to 133.2%. There are different angular intensity profiles for different geometries of macro-lenses, which can be used for specific applications such as indoor lighting and local or focused illumination for reading. Besides, this method is practical because enlarging the size of micro-lens makes manufacturing easier.

As shown in Figure 1, the angular intensity distribution profiles are different for different geometries of macro-lenses, in which the intensity of (b) and (c) are mostly focused on small viewing angles due to the sharp geometries of pyramid and cone, resulting in guidance of light to the tip.

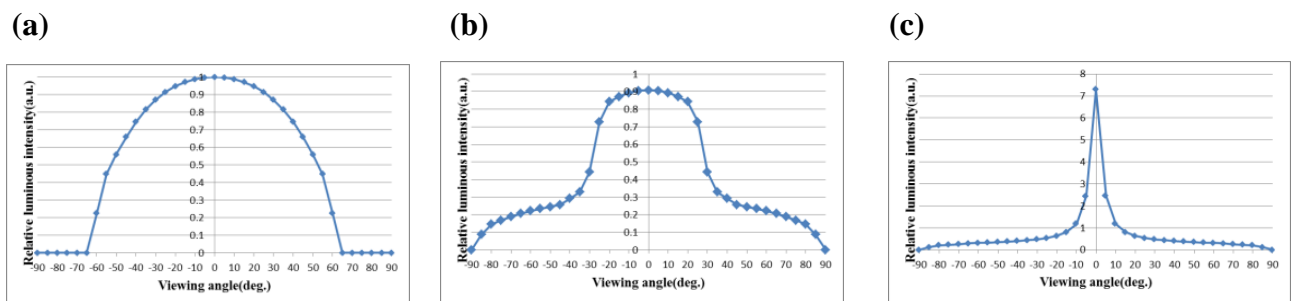


Fig. 1. Angular intensity distribution for (a) spherical; (b) pyramidal; and (c) conical macro-lenses.

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