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High efficient plastic substrate polymer white light emitting diode

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Abstract White polymer light emitting diode (PLED) has attracted the interest of researchers by the advantage of having low cost, flexible light sources. One of the major advantages of PLED is that it can be able to fabricate in flexible plastic substrate instead of glass substrate. Generally PLED's requires a substrate of high refractive index to enhance the amount of trapped light in the device, but the refractive index of flexible plastic substrate is low ($n < 1.6$). In this paper, we present a white PLED on a flexible plastic substrate with a new enhancement method. In which the semi-transparent gold layer is sandwiched between the layers of tantalum oxide and molybdenum oxide which does not require a high refractive index substrate. Using this design, the extraction efficiency of the device is increased from 1.5 to 2.1 cw compared to that of the device using glass substrate.

Keywords Refractive index · White polymer light emitting diode

1 Introduction

White polymer light-emitting devices (PLED) have attracted considerable interest for many applications such as flat panel displays and interior lighting source. The PLEDs are considered to be more effective for next generation planar lighting source due to its characteristics like ultrathin in thickness, light weight, and environmentally protective nature. The efficiency of conventional devices remains small due to trapping of light in the stratified thin-film structure. The research community has therefore focused on using high refractive index substrates in place of standard materials to enhance the outcoupling of this trapped light (Reineke et al. 2009; Mikami and Koyanagi 2009; Mladenovski et al. 2009).

This paper demonstrate a outcoupling enhancement method that does not rely upon high refractive index substrates and is therefore fully compatible with the use of low cost flexible

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