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# Achieving high efficiency in Organic Light-Emitting Diodes by thermal Annealing

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Organic light-emitting diodes (OLEDs) have been widely investigated since Tang and VanSlyke reported the first high-brightness and low-voltage heterojunction device. Tremendous efforts have been directed toward improving the efficiency of OLEDs. One of the conditions of achieving high efficiency in OLEDs is a balance of the hole–electron injection[1]-[2].

Apart from the above, In the other technology of semiconductor, thermal annealing attribute the improved the efficiency to change in the bulk heterojunction material. It was found that the improved nanoscale morphology, the increased crystallinity of the semiconducting polymer, and the improved contact to the electron-collecting electrode facilitate charge generation, charge transport and charge collection at the electrodes, thereby enhancing the device efficiency[3]. In fact, Researchers know that the organic layers are damaged by thermal annealing in OLEDs. But, thermal treatment after deposition of the functional layers of OLEDs seems to be an additional way to further enhance the efficiency of device[4]. In this paper, we examined the effect of annealing on the efficiency of organic light-emitting diodes. The detailed electroluminescent (EL) characteristics were compared before and after annealing at 60~100 ℃ for 30 min. It was found that better luminous efficiency could be achieved with green device at 80 ℃. It is believed that the optimum thermal treatment helps the electron injection. Also, interdiffusion between organic layers may occur. This interdiffusion was believed to be helpful for the elimination of heterointerface and, therefore, improves the overall the efficiency of OLED.

[Reference]

[1] M. Hack, J. J. Brown, J. K. Mahon, R. Kwong, and R. Hewitt, J. Soc. Inf. Display, vol. 9, no. 3, pp. 191–195, 2001.

[2] R. C. Kwong, M. R. Nugent, L. Michalski, T. Ngo, K. Rajan, Y. J. Tung, M. S. Weaver, T. X. Zhou, M. Hack, and J. J. Brown, In SID Int. Symp. Dig. Tech. Papers, 2002, vol. 33, pp. 1365–1367.

[3] Wanli Ma, Cuiying Yang, Xiong Gong, Kwanghee Lee, and Alan J. Heeger, Adv. Funct. Mater 2005, 15, 1617-1622.

[4] J. X. Sun, X. L. Zhu, X. M. Yu, H. J. Peng, M. Wong, and H. S. Kwok, IEEE, VOL. 2, NO. 2, 2006.