White Organic Light-Emitting Diodes with Soluble-processed Single EML Layer Consisted of Blue and Orange Iridium dopants

O Jun Kwon[1], Suhwan Lee[1], Jung Woon Kim[2], Seonghwa Choi [3], Dong Jun Lee[1], Jaemin Lee[4], Jeonghun Kwak[3], Eunhee Lim [2] and Byung Jun Jung [1]

[1]Dept. of Materials Science and Engineering, University of Seoul, Seoul 121-791, Korea

Tel.:82-2-6490-2412, E-mail: jungbj@uos.ac.kr

[2]Dept. of Chemistry, Kyonggi University, Suwon 130-743, Korea

[3]Dept. of Electronic Engineering, Dong-A University, Busan 604-714, Korea

[4]Korea Research Institute of Chemical Technology (KRICT), Daejeon 305-600, Korea

White Organic Light-emitting diodes (OLEDs) have been spotlighted as a next generation lighting. In this study, we fabricated white organic light-emitting diodes (OLEDs) with different ratio of the blue and orange dopants. The emitting layer (EML) is composed of a polymeric material, poly(9-vinylcarbazole) (PVK), and a carbazole-based small molecule. The blue dopant is bis[2-(4,6-difluorophenyl)pyridinato-C2,N](picolinato)iridium(III) (FIrpic) and the orange dopant is bis(2-phenylbenzothiazolato)(acetylacetonate)iridium(III) ($Ir(BT)_2acac$). The device structure is ITO/poly(3,4-ethylenedioxythiophene):poly(4-styrenesulfonate) (PEDOT:PSS)/soluble processed EML/1,3-bis(3,5-dipyrid-3-yl-phenyl)benzene (BmPyPB)/LiF/Al.

The electroluminescent spectra are shown in Figure 1(a) as the dopant ratios of blue and orange from 85:15 to 95:5. The Commision Internationale de L'Eclairage (CIE) coordinates of each spectrum are (0.46, 0.48), (0.44, 0.47), (0.41, 0.46) and (0.37, 0.45). The device of 95:5 as blue: orange dopant ratio shows the emission close to white with around 10 % of maximum external quantum efficiency (EQE). As the ratio of blue dopants increased, EQE of devices are reduced. The device of 90:10 emits warm white emission of (0.44, 0.47) with 12% of maximum EQE.

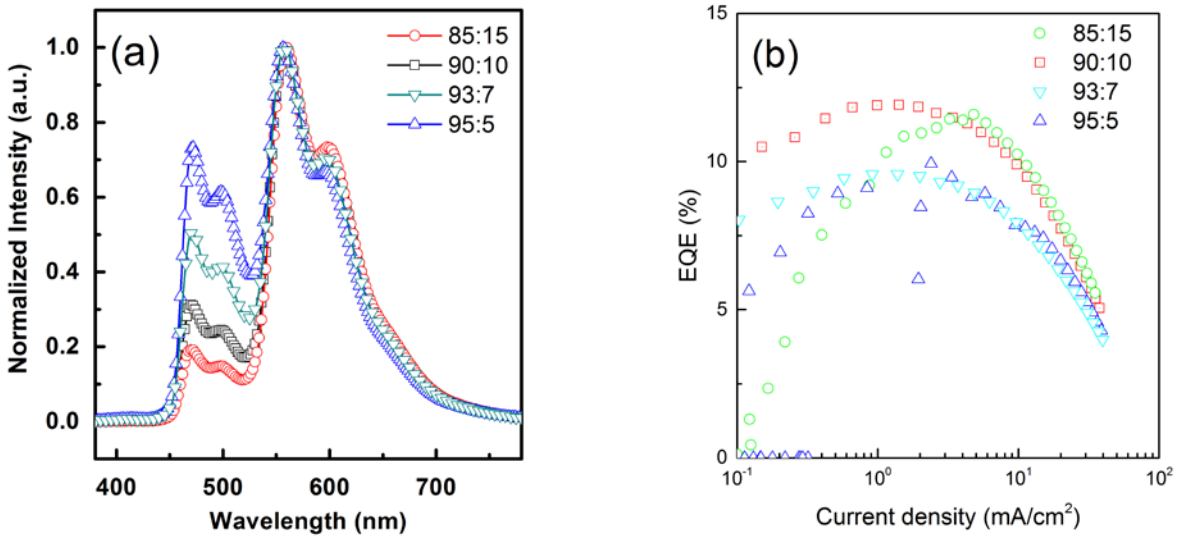

Fig. 1. (a) EL spectra of WOLEDs (b) EQE-current density curves as blue: orange dopant ratio

Acknowledgment

This work was supported by the R&D Convergence Program of NST (National Research Council of Science & Technology) of Republic of Korea (Younghapsilyonghwa-13-10-KITECH).

References

1. Y.-L. Chang, Z.-H. Lu, *J. Display Technol.* 9, 459 (2013)
2. N. Thejokalyani, S.J.Dhoble, *Renew. Sust. Energ. Rev.* 32, 448 (2014)