Blue organic light-emitting diodes based on anthracene derivatives containing electron-withdrawing heteroaromatics

Jwajin Kim[1], Se Hyun Kim[1], Ho Won Lee[2], Song Eun Lee[2], Young Kwan Kim[2] and Seung Soo Yoon[1*]*

[1] Dept. of Chemistry, Sungkyunkwan University, Suwon, Korea

Tel.:82-31-290-7071, E-mail: ssyoon@skku.edu

[2] Dept. of Information Display, Hongik University, Seoul, Korea

Tel.:82-2-3142-3750, E-mail: kimys@hongik.ac.kr

Organic light-emitting diodes (OLEDs) has been the interesting subject in both academia and industry due to their unique properties that suitable for flat-panel displays and solid-state lighting.[1,2] For full-color display, the three primary color emitters such as red, green, and blue emitters are needed. Among those, blue emitter have to be developed due to their lower efficiencies than those of red and green emitters.[3] In this research, we designed and synthesized three blue fluorescent materials (**1-5**) based on anthracene derivatives containing electron-withdrawing heteroaromatics.

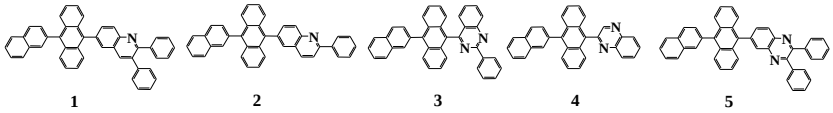

Figure 1. Molecular Structures of Blue emitters 1-5.

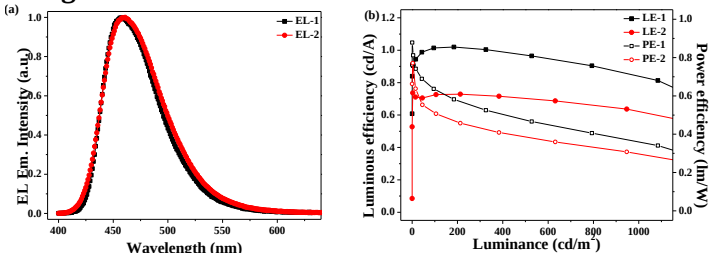

Fig. 2. (a) Electroluminescence (EL) emission spectra and (b) luminous efficiency- and power efficiency-luminance graph of blue emitters 1 and 2.

To investigate electroluminescent properties of these blue emitting compounds, devices were fabricated as following structure : indium tin oxide (ITO) (180 nm) / *N*,*N*′-diphenyl-*N*,*N*′-(1-napthyl)-(1,1'-phenyl)-4,4'-diamine (NPB) (20 nm) / emitting materials (30 nm) / bathophenanthroline (Bphen) (30 nm) / lithium quinolate (Liq) (2 nm) / Al (100 nm). Particularly, a device using 2,3-diphenyl-6-[10-(naphthalen-7-yl)anthracen-9-yl]quinoline (**1**) as emitter showed good EL properties with power efficiency and luminous efficiency of 0.63 lm/W and 1.02 cd/A, at 100 cd/m^2, respectively. The CIE coordinates of this device was (0.17, 0.22) at 6.0 V.

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