Supporting Information

Highly Efficient and Stable Blue Organic Light-Emitting Diodes through Selective Quenching of Long-Living Triplet Exciton of Thermally Activated Delayed Fluorescence Emitter

Won Jae Chung and Jun Yeob Lee*

Electronic Supplementary Material (ESI) for Journal of Materials Chemistry C. This journal is © The Royal Society of Chemistry 2021
Figure S1. (a) UV-vis absorption spectra and normalized PL spectra of TBPe and 5CzCN (1.0 × 10⁻⁵ M THF solution). (b) Normalized PL spectra of 5CzCN film, 5CzCN:TBPe co-doped film (in DPEPO film doped with 20 wt% or 20 wt%:1 wt%).
Figure S2. (a) Experimental film structure of the thickness dependent PL ratio measurement. (b) PL ratios, corresponding fitting, and the fitted value for $L_D$ of 5CzCN emitter doped with 20 wt% in DPEPO matrix.
Figure S3. The transient PL decay of all films.
Supplementary equations for exciton diffusion length (Figure S2)

The exciton diffusion equation could be expressed as \[ ^{[1-4]} \]

\[ L_D^2 \cdot \frac{\partial^2 n(x)}{\partial x^2} - n(x) + \tau \cdot G = 0 \]  

(1)

where \( L_D \) is the exciton diffusion length, \( x \) is the distance from the surface in the layer, \( n(x) \) is the exciton density, \( \tau \) is the exciton lifetime and \( G \) is exciton generation rate.

In addition, assuming that a layer of thickness \( d \) has a quenching interface (C_{60}), the boundary conditions are

\[ n(x = 0) = 0, \]  

(2-1)

\[ \frac{\partial n}{\partial x} \bigg|_{x = d} = 0, \]  

(2-2)

\[ G(x) = G_0. \]  

(2-3)

Solving equation 1 with the boundary conditions of equation 2,

\[ \frac{PL_Q}{PL_B} (PL ratio) = 1 - \frac{L_D}{d} \cdot \frac{1 - \exp(-2d/L_D)}{1 + \exp(-2d/L_D)}. \]  

(3)
Reference