

Accepted Manuscript

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PII: S0143-7208(16)31454-1

DOI: [10.1016/j.dyepig.2017.01.055](https://doi.org/10.1016/j.dyepig.2017.01.055)

Reference: DYPI 5755

To appear in: *Dyes and Pigments*

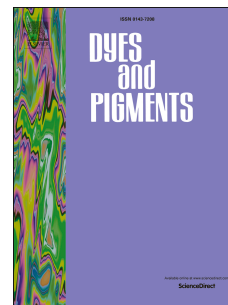
Received Date: 21 December 2016

Revised Date: 15 January 2017

Accepted Date: 21 January 2017

Please cite this article as: Bell BM, Clark TP, De Vries TS, Lai Y, Laitar DS, Gallagher TJ, Jeon J-H, Kearns KL, McIntire T, Mukhopadhyay S, Na H-Y, Paine TD, Rachford AA, Boron-based TADF emitters with improved OLED device efficiency roll-off and long lifetime, *Dyes and Pigments* (2017), doi: 10.1016/j.dyepig.2017.01.055.

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Boron-Based TADF Emitters with Improved OLED Device Efficiency

Roll-Off and Long Lifetime

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Keywords: Thermally Activated Delayed Fluorescence, Boron, Efficiency Roll-off, Lifetime, Triplet Energy

Abstract

A class of four-coordinate boron complexes is reported that contain both electron-rich and electron-poor functional groups. Judicious selection of donor and acceptor moieties with the use of a boron atom as a separating node yields charge transfer complexes capable of thermally activated delayed fluorescence (TADF). Complexes were prepared by a modular method providing access to a wide range of emission colors. The singlet (S_1) and triplet (T_1) energies are independently tuned to achieve a small S_1 - T_1 gap. Raising and lowering of S_1 and T_1 states can be predicted using cyclic voltammetry, NTO analysis, and spin density distribution as determined using Density Functional Theory; separation of the hole and electron wavefunction for S_1 excitation and delocalization of spin density distribution in the T_1 state can help in achieving negligible S_1 - T_1 gap. Although photoluminescent quantum yields of the boron complexes in a host matrix are less than 65%, OLED device external quantum efficiencies of up to 8.1% have been achieved at a luminance of 1000 cd/m². Selection of a

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