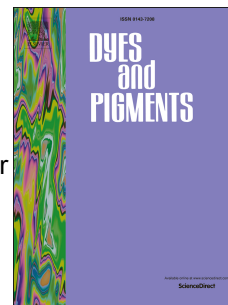


Accepted Manuscript

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PII: S0143-7208(17)30626-5

DOI: [10.1016/j.dyepig.2017.06.048](https://doi.org/10.1016/j.dyepig.2017.06.048)

Reference: DYPI 6069

To appear in: *Dyes and Pigments*

Received Date: 27 March 2017

Revised Date: 17 June 2017

Accepted Date: 19 June 2017

Please cite this article as: Liu D, Yao R, Dong R, Jia F, Fu M, A strategy to increase phosphorescent efficiency without perturbing emission color for benzothiazole-containing iridium phosphors, *Dyes and Pigments* (2017), doi: 10.1016/j.dyepig.2017.06.048.

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A Strategy to Increase Phosphorescent Efficiency without Perturbing Emission Color for Benzothiazole-Containing Iridium Phosphors

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Abstract

A series of bis(2-phenylbenzothiazolato-*N,C*^{2'})iridium(acetylacetonate) derivatives are developed for use in phosphorescent organic light-emitting diodes (PhOLEDs). Fluorine (-F), trifluoromethyl (-CF₃), *N*-phenylcarbazole-3-yl (-Cz) and diphenylamino (-Ph₂N) are incorporated at the 5- or 7-site of the benzothiazole ring to adjust the properties and performance of the complexes. The emitting colors of these iridium phosphors are almost independent of the substituents and the substitution positions, but -F or -CF₃ always resulted in increased phosphorescence quantum yields and decreased lifetimes in photoluminescence. Furthermore, the 5-F/CF₃-substituted iridium complexes exhibited higher efficiencies than their analogues 7-site isomers in OLEDs. In particular the device based on **1** exhibits a maximum luminance efficiency of 64 cd A⁻¹ (21.3%). Theoretical calculations were performed to interpret the negligible color tuning effect.

Keywords: Organic light-emitting diodes (OLEDs), iridium complexes, orange phosphorescence, benzothiazole based ligand, trifluoromethyl

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