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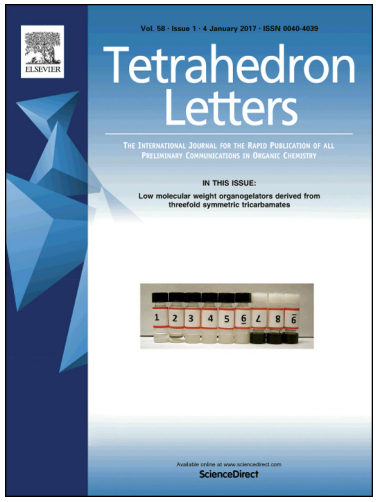

An efficient material via meta-position connection as thermally activated delayed fluorescence emitter for Organic Light-Emitting Diodes

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An efficient material via meta-position connection as thermally activated delayed fluorescence emitter for Organic Light-Emitting Diodes

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Abstract

A novel compound was designed and synthesized by connecting a dicyanobenzene acceptor and two 9,9-dimethyl-9,10-dihydroacridine donors to the 1,3,5-position of a phenyl ring by *meta*-position connection. This compound, which is a novel emitter for OLED devices, exhibits preferable heat stability. Moreover, the energy gap between its singlet and triplet states is as small as 0.04 eV, resulting in this molecule possesses thermally activated delayed fluorescence. Therefore, the corresponding device showed efficient electroluminescent performances. The maximum external quantum efficiency, maximum current efficiency, maximum power efficiency and maximum luminance were 16.5%, 40.8 cd A^{-1}, 45.8 lm W^{-1} and 5120 cd m^{-2}, respectively. In addition, the $CIE_{x,y}$ only changed from (0.22, 0.38) to (0.22, 0.39) over the entire operating voltage range, which confirms that the device possesses highly stable chromaticity with respect to the current density. Based on these experimental results, *meta*-connected type structures may provide a new approach for developing high-performance TADF emitters for OLED applications.

Keywords: TADF, donor-acceptor structure, *meta*-position connection, OLED

Introduction

In the past two decades, organic light-emitting diodes (OLEDs) have attracted considerable attention due to their enormous potential for applications in both new generation full-color flat-panel displays and solid-state lighting sources.[1-3] As this new