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Nondoped Deep Blue OLEDs Based on Bis-(4-benzenesulfonyl-phenyl)-9-phenyl-9H-carbazoles

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Abstract:

Two bipolar materials based on 9-phenylcarbazole and diphenyl sulfone for nondoped deep blue OLEDs, namely bis-(4-benzenesulfonyl-phenyl)-9-phenyl-9H-carbazoles, have been designed and synthesized by Suzuki coupling reactions. Their thermal, photophysical, and electrochemical properties have been systematically investigated. The nondoped devices using 3,6-bis-(4-benzenesulfonyl-phenyl)-9-phenyl-9H-carbazoles and 2,7-bis-(4-benzenesulfonyl-phenyl)-9-phenyl-9H-carbazoles as the emitters show deep blue emission color with peaks at 424 and 444 nm, and the Commission Internationale de l'Eclairage (CIE) coordinates of (0.177, 0.117) and (0.160, 0.117), respectively. Furthermore, these materials based devices have high color-purity with small width at half maximum (FWHM) of 65 and 73 nm, respectively. The results provide a novel approach for the design of deep blue emitter for nondoped OLEDs.

Keywords: carbazole, sulfone, color-purity, nondoped, deep blue, OLEDs

1. Introduction

Since the first high-efficiency organic light emitting diodes (OLEDs) reported by Tang [1] et al in

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