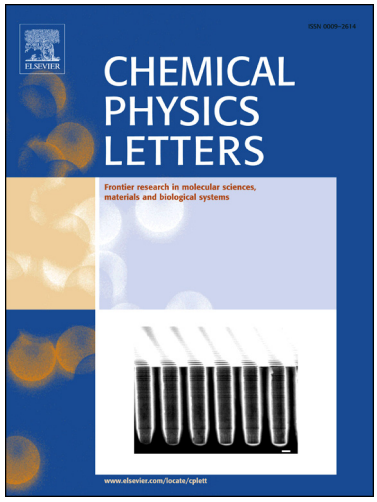

Research paper

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Diphenylamino-substituted bicarbazole derivative: hole-transporting material with high glass-transition temperature, good electron and triplet exciton blocking capabilities and efficient hole injection

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Abstract

A diphenylamino-substituted bicarbazole derivative (BCZDA) with high glass-transition temperature (170 ℃) has been developed. The introduction of the strongly electron-donating diphenylamino group endows this compound with high HOMO (-4.94 eV), LUMO (-1.94 eV) and triplet energy (2.65 eV) levels which are beneficial for hole injection and electron/triplet exciton blocking. By adopting this compound as the hole-transporting layer, both fluorescent and phosphorescent devices with good performance have been realized. Through the device study, the performance of this compound is proved to be comparable to that of NPB. The utility of this compound as a host has also been evaluated.

Keywords: Organic light-emitting diode; Hole-transporting material; 3,3'-bicarbazole.

1. Introduction

Due to the tremendous commercial value in displays and lightings, organic light-emitting diodes (OLEDs) have attracted a great deal of research interest [1]. The construction of OLEDs requires various functional materials, such as hole and electron transporters [2], emitters [3,4] and hosts [5] for fluorescent/phosphorescent dopants. Although a number of material systems have been adopted as electron transporters, emitters and host materials, the hole transporters are generally limited to the aromatic amine system [6-8]. NPB (*N,N'*-di(1-naphthyl)-*N,N'*-diphenylbenzidine), TPD (4,4'-bis[*N*-(*p*-tolyl)-*N*-phenylamino]biphenyl), TCTA (4,4',4''- tris(*N*-carbazolyl)triphenylamine) and TAPC (1-bis[4-[*N*,*N*-di(4-

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