

New TADF emitters based on pyridazine for OLEDs applications

Haixia LI,^a David KREHER,^{a,b} Lydia SOSA-VARGAS,^a Fabrice MATHEVET,^{a,c} Chihaya ADACHI^c

David.kreher@uvsq.fr

^a Institut Parisien de Chimie Moléculaire (UMR 8232), Sorbonne Université,
4 place Jussieu, 75005 Paris, France

^b Institut Lavoisier de Versailles (UMR8180), Université de Versailles Saint Quentin (Université Paris-Saclay),
45 Avenue des États-Unis, 78000 Versailles, France

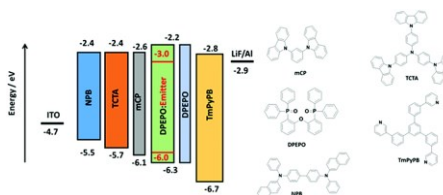
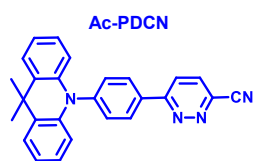
^c Center for Organic Photonics and Electronics Research (OPERA), Kyushu University,
744 Motooka, Nishi-ku Fukuoka 819-0395, Japan

Abstract:

As a new kind of a flat emitting technology, organic light-emitting diodes (OLEDs) show many improvements over liquid crystal displays (LCDs) with impressive advantages. In this context, compounds with thermally activated delayed fluorescence (TADF) properties are outstanding from their special emitting mechanism which can harvest excitons of triplet state to obtain high photoluminescence quantum yield (PLQY). Due to its advantages of heavy metal free, high efficiency, long lifetime, TADF materials have triggered a new insight into third generation organic semiconductors for OLED application.

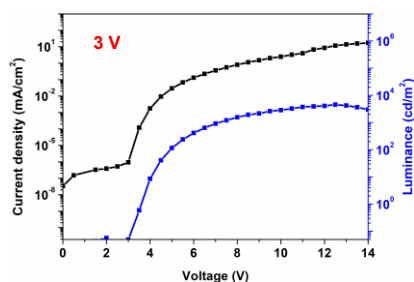
Regarding this work, several molecules of the Donor-Acceptor (DA) and / or DAD type incorporating various electro-deficient nitrogenous hearts (pyridazine, pyridine, bipyridine, bipyridazine) have been successfully prepared, their design being designed with the aim of obtaining TADF (Thermally Activated Delayed Fluorescence) emitters. Among them, pyridazine based chemical structures have been characterized by nuclear magnetic resonance (NMR) and high-resolution mass spectroscopy (HRMS). Their photophysical properties have been studied in solution and in the solid state. In these structures, intramolecular charge transfer is produced via intermolecular interactions between the D and A groups, and their study revealed that some of them exhibit a TADF character. The electroluminescence properties of the most promising compounds have also been studied in OLED configuration.

Electroluminescence performance- 10 wt% Ac-PDCN doping in DPEPO

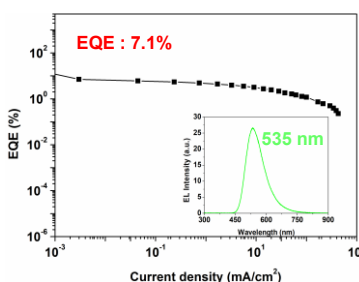


PLQY : 60% in toluene; 44% in doped DPEPO film

Energy level diagram of OLED device



J-V-L characteristics



EQE-current density characteristics of device, inset: EL spectra

References: Haixia LI PhD (defended end of november 2021) + New. J. Chem 2022 (just submitted).