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オキサジアゾール、トリアゾールを有する高効率熱活性型遅延蛍光材料の開発

Development of oxadiazole- and triazole-based highly-efficient thermally-activated delayed-fluorescence (TADF) emitters

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The use of thermally-activated delayed fluorescence (TADF) is an effective way of converting singlet excitons into triplet excitons. TADF emitters are promising materials for organic light emitting diodes (OLEDs) since they can realize high electroluminescence efficiency without heavy atoms. Using TADF, external quantum efficiencies (EQEs) comparable to those obtained from heavy-atom complexes have been achieved.[1] Here, we report novel TADF emitters containing 2,5-diphenyl-1,3,4-oxadiazole and 3,4,5-triphenyl-4*H*-1,2,4-triazole as electron acceptors and phenoxazine as a donor (PXZTAZ, PXZOXD, PXZ2TAZ, and PXZ2OXD). An OLED using PXZ2OXD as an emitter exhibits an EL quantum efficiency as high as 14.9% and green emission (λ_{max}=508 nm).

Temperature dependence of time-resolved photoluminescence (PL) measurements of a 6wt% PXZ2OXD-doped DPEPO film suggests that PXZ2OXD shows TADF. Under N_2 flow, the PL efficiency of the doped film was 83.8%. The delayed component of the total PL efficiency was estimated to be 17.8%. An OLED using PXZ2OXD as an emitter exhibited green emission and EQE as high as 14.9% at a current density of 0.01 mA/cm^2 (Fig. 1). Thus, PXZ2OXD can realize effective production of singlet excitons, leading to the high EQE.

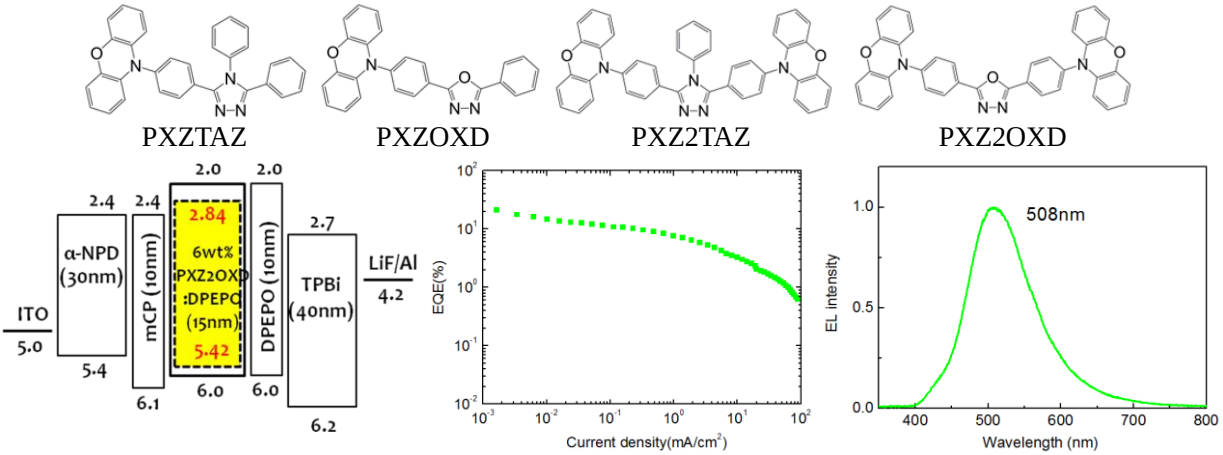

Fig. 1. Chemical structures of TADF emitters, device structure, EQE-J curve, and EL intensity of the OLED using PXZ2OXD as an emitter.

[1] H. Uoyama, K. Goushi, K. Shizu, H. Nomura, and C. Adachi, Nature, **492**, 234-238 (2012).

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