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Electroluminescent devices based on organic materials are of considerable interest owing to their attractive physical chemical properties and potential applications to flat panel displays. In spite of some advantages, organic materials have a crucial fundamental limit correlated with singlet and triplet exciton formation probability. One of the advance of organic light-emitting diode (OLED) technology is the discovery of electrophosphorescence with which one can overcome the upper limit of the internal quantum efficiency. The design and synthesis of triplet emitting materials containing heavy-metal complexes, where strong spin-orbit coupling leads to singlet-triplet state mixing which removes the spin-forbidden nature of the radiative relaxation of the triplet state, are therefore particularly important in achieving high-efficiency electrophosphorescence in OLEDs.

To understand the exact phosphorescent dopant-induced photoluminescence (PL) properties of photoactive thin films consisting of a π -conjugated polymer matrix and a triplet dopant, two types of polymer, poly(9-vinylcarbazole) (PVK) and poly[9,9-bis(2-ethylhexyl)fluorene-2,7-diyl] (PF2/6) doped by triplet emitters for OLED, either iridium(III)fac-tris(2-phenylpyridine) (Ir(ppy)₃) or iridium(III)bis[(4,6- fluorophenyl)-pyridinato-N,C2']picolate (FIrpic), were prepared as thin films by the conventional spin coating method. Those doped films, as well as their pristine films, on quartz substrates were characterized by means of UV-Vis absorption, and PL and PL excitation (PLE) spectroscopy for a wide spectral range. It was found that the facility of exciton migration from matrix to dopant, and subsequent triplet emission, was significantly pronounced in the PVK-based blend systems. At the same time, PF2/6 blend systems showed an efficient PL quenching upon doping, although the PL maxima of the PVK and the PF2/6 as thin films were virtually identical.