

Phosphorescent Polymeric Light-emitting Diodes with High Efficiency

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ABSTRACT

We study the characteristics of polymeric light-emitting diodes whose emitting layer is composed of PVK, PBD, TPD, and Ir(mppy)₃. The Ir(mppy)₃ is known as the heavy metal complex, and is supposed to improve the efficiency of devices because strong spin-orbit coupling in the complex enables triplet excitons, which are originally forbidden to the radiative relaxation, to relax to photons. In order to achieve the maximum luminous efficiency, we produced devices with different cathodes, thicknesses of films, and also single, and double-layer structures. Furthermore, based on these highly efficient devices, we propose a possible future direction to fabricating multilayer white PLED with high efficiency. The phosphorescent, green emitting part is achieved by the four-ingredient blend described above. Blue-emitting PFO may also be added to the blend or may be separated to another layer at the cathode side. The red emitting part is done by blending TFB and red-emitting DCJTB, and this layer also serves as the hole-transporting material. The buffer-layer technique is used to produce multilayer structures.