

Simplified Single-Layer Polymer Light-Emitting Diodes

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We present efficient polymer light-emitting diodes comprising only of a simplified single-layer structure. It is found that Tris(2-phenylpyridine)iridium (Ir(ppy) 3) doped into mixed host of Poly(vinylcarbazole) (PVK) and 4,4'-N,N-dicarbazole-biphenyl (CBP) can be used to directly inject and transport holes from an indium tin oxide(ITO) anode, and thus simplify the device structure and manufacturing processes. The simple OLEDs show a peak luminance of 20400cd/m² and a maximum efficiency of 7.31cd/A. We also report for the first time the effect of N,N'-diphenyl-N,N'-(bis(3-methylphenyl)-[1,1'-biphenyl]-4,4'-diamine (TPD) doping on the carrier-injection-balance in this device. Thus, a peak luminance of 45600cd/m² and a maximum current efficiency value of 13.65cd/A are achieved in this device. The marked improvement is attributed to the introduction of the TPD, leading to a better carrier-injection-balance.