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Syntheses and Characterization of Polyimides Containing Metal Phthalocyanines

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In organic electroluminescent devices, a high potential barrier for injection of holes or electrons at the interface may produce joule heating, which causes a local aggregation of the molecules at the interface. Therefore, the ITO buffer layer made of copper phthalocyanine (CuPc) was introduced to improve the contact between the HTL and ITO, which suppressed voltage increase during operation of the device in a constant current mode. Although CuPc and derivatives have exhibited interesting properties for many applications in materials science due to their high thermal, chemical stability, photosensitivity and high electron transfer abilities, but they are insoluble in most organic solvents, which has prevented them from being employed in functional colorants that can take advantage of their useful electron transfer properties. The solubility can be altered by substituting suitable functional groups in the peripheral benzene rings of the phthalocyanine structure. Therefore, in this study we synthesized soluble 2,2-bis(3,4-dicarboxy-phenyl)hexafluoroisopropane dianhydride-2,4,5,6-tetra-methyl-1,4-phenylene-dimiane (6FDA-4MPDA) polyimide (PI) and 2,2-bis(3,4-dicarboxy-phenyl)hexafluoroisopropane dianhydride-4,4'-oxy dianiline (6FDA-ODA) PI containing phthalocyanine according to kinds of central metal, respectively. We fabricated organic light-emitting devices with the synthesized polyimide as a hole transporting layer by spin coating technique. The device performance and characteristics such as electroluminescent properties, and current-voltage-brightness relationship were discussed.