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Improvement of the luminous efficiency of organic light emitting diode using LiF anode buffer layer

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The multilayer structure of the organic light emitting diode has merits of improving interfacial characteristics and helping carriers inject into emission layer and transport easier.

There are many reports to control hole injection from anode electrode by using transition metal oxide as an anode buffer layer, such as V2O5, MoO3, NiO, and Fe3O4.

In this study, we apply thin films of LiF which is usually inserted as a thin buffer layer between electron transport layer(ETL) and cathode, as an anode buffer layer to reduce the hole injection barrier height from ITO. The thickness of LiF as an anode buffer layer is tested from 0 nm to 1.0 nm.

As shown in the figure 1 and 2, the luminous efficiency versus current density is improved by LiF anode buffer layer, and the threshold voltage is reduced when LiF buffer layer is increased up to 0.6 nm then the device does not work when LiF thickness is close to 1.0 nm

As a result, we can confirm that the thin layer of LiF, about 0.6 nm, as an anode buffer reduces the hole injection barrier height from ITO, and this results the improved luminous efficiency. This study shows that LiF can be used as an anode buffer layer for improved hole injection as well as cathode buffer layer.

Keywords: OLED, buffer layer, LiF