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Charge injection mechanism through LiF layer in organic light emitting diodes: randomly oriented dipole model HONG KEE YOON, CHOON SUP YOON, KAIST — Efficient charge injection at the metal/organic interfaces is essential in organic light emitting diodes and other organic electronic devices because it affects the efficiency of the devices significantly. To increase the electron injection a strategy of inserting a thin layer of lithium fluoride (LiF) or other alkali halides between a metal electrode and an active organic layer has been used widely, but the physical mechanism underlying the charge injection through the LiF layer remains unexplained. In order to explain the charge injection mechanism, it was assumed either the LiF dipoles were aligned statistically opposite to the applied electric field direction or the LiF molecules were dissociated and diffused into the organic layer. However, experimental evidences show that both presumptions are highly unlikely. Based on a randomly oriented dipole model, in conjunction with the local process of charge injection by the electric dipoles, we demonstrate that the randomly oriented LiF dipoles or any other dipoles can enhance the charge injection, which agrees well with the experimental results.

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