Electron Injection Enhancement in OLEDs with Interfacial Chemical Reactions between 8-hydroxyquinolatolithium and Aluminum

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One of organic electron injection layer materials, 8-hydroxyquinolatolithium (Liq) showed improved device performance and chemical stability as well as a mild preparation process.1-3 Here the interface chemical reaction at the Liq/Al interfaces was investigated by using high resolution synchrotron radiation photoelectron spectroscopy. The different deposition sequence gives different reactions. While strong reactions are observed throughout the Liq film when Al is deposited on Liq layer, an interface localized reaction occurs just at the interface upon the Liq deposition onto Al surface. Either sequence of film stacks, Liq/Al and Al/Liq produce an interface gap state respectively at 2.1 eV and 2.8 eV below the Fermi level. Both of the highest occupied molecular orbital (HOMO) and N 1s core level peaks are shifted to the high binding energy side by 0.35 eV on Al/Liq whereas it is not the case on Al/Liq. Based on these observations, the differences in electron injection barrier and interface dipole between the two opposite deposition sequences could be drawn.

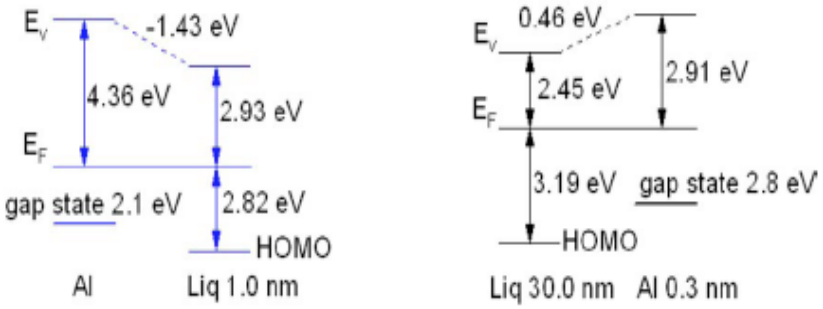

Fig. 1. Energy level alignment diagrams: Liq/Al (blue line) and Al/Liq (black line).

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