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Deposition sequence dependent variation of interface chemical reaction between 8-hydroxyquinolatolithium and Al

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One of organic electron injection layer materials, Liq (8-hydroxyquinolatolithium) shows a few advantages over other inorganic materials for organic light emitting device (OLEDs). The interface chemical reaction at the Liq/Al interfaces was investigated by using high resolution synchrotron radiation photoelectron spectroscopy. The different deposition sequence (Liq (0.4, 1 nm) / Al (50 nm) and Al (0.1, 0.3 nm) / Liq (30 nm)) gives different reactions. The Li 1*s* shows a peak at high binding energy side upon the Al deposition on Liq, which can be attributed to ionic Li atoms throughout the Liq film. However, the reversed stack does not show any changes in Li 1*s* core levels. 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. The valence and N 1*s* core levels are shifted to the high binding energy side by 0.35 eV on Al/Liq whereas it is not the case on Liq/Al. This can be related to the doping induced band bending with ionic Li. The enhancement of the electron injection with Liq layer on the Al can be explained by the work function reduction of Al surface. We propose that Liq/Al be used as an efficient electron injection layer for inverted OLED.