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Low Temperature Encapsulation-Layer Fabrication of Organic-Inorganic Hybrid Thin Film by Atomic Layer Deposition-Molecular Layer Deposition

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We fabricate encapsulation-layer of OLED panel from organic-inorganic hybrid thin film by atomic layer deposition (ALD) molecular layer deposition (MLD) using Al2O3 as ALD process and Adipoyl Chloride (AC) and 1,4-Butanediamine as MLD process. Ellipsometry was employed to verify self-limiting reaction of MLD. Linear relationship between number of cycle and thickness was obtained. By such investigation, we found that desirable organic thin film fabrication is possible by MLD surface reaction in monolayer scale. Purging was carried out after dosing of each precursor to eliminate physically adsorbed precursor with surface. We also confirmed roughness of the organic thin film by atomic force microscopy (AFM). We deposit AC and 1,4-Butanediamine at 70^{o}C and investigated surface roughness as a function of increasing thickness of organic thin film. We confirmed precursor's functional group by IR spectrum. We calculated WVTR of organic-inorganic hybrid super-lattice epitaxial layer using Ca test. WVTR indicates super-lattice film can be possibly use as encapsulation in flexible devices.

Keywords: Atomic Layer Deposition, Molcecular Layer Deposition, Encapsulation, OLED