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What Is the Key Vacuum Technology for OLED Manufacturing Process?

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An OLED(Organic Light-Emitting Diode) device based on the emissive electroluminescent layer a film of organic materials. OLED is used for many electronic devices such as TV, mobile phones, handheld games consoles. ULVAC's mass production systems are indispensable to the manufacturing of OLED device. ULVAC is a manufacturer and worldwide supplier of equipment and vacuum systems for the OLED, LCD, Semiconductor, Electronics, Optical device and related high technology industries. The SMD Series are single-substrate sputtering systems for deposition of films such as metal films and TCO (Transparent Conductive Oxide) films. ULVAC has delivered a large number of these systems not only Organic Evaporating systems but also LTPS CVD systems. The most important technology of thin-film encapsulation (TFE) is preventing moisture(H_2O) and oxygen permeation into flexible OLED devices. As a polymer substrate does not offer the same barrier performance as glass substrate, the TFE should be developed on both the bottom and top side of the device layers for sufficient lifetimes. This report provides a review of promising thin-film barrier technologies as well as the WVTR(Water Vapor Transmission Rate) properties. Multilayer thin-film deposition technology of organic and inorganic layer is very effective method for increasing barrier performance of OLED device. Gases and water in the organic evaporating system is having a strong influence as impurities to OLED device. CRYO pump is one of the very useful vacuum components to reduce above impurities. There for CRYO pump is faster than conventional TMP exhaust velocity of gases and water. So, we suggest new method to make a good vacuum condition which is CRYO Trap addition on OLED evaporator. Alignment accuracy is one of the key technologies to perform high resolution OLED device. In order to reduce vibration characteristic of CRYO pump, ULVAC has developed low vibration CRYO pumps to achieve high resolution alignment performance between Metal mask and substrate. This report also includes ULVAC's approach for these issues.

Keywords: flexible OLED device, evaporating system, thin film encapsulation, CRYO pump