

새로운 ITO 전극구조에 의한 AC-PDP 효율향상에 대한 연구

남형우¹, 송인철¹, 심승보¹, 박정후¹, 이호준¹

¹부산대학교 전자전기공학과 Plasma & PDP lab

AC-PDP(Alternative Current Plasma Display Panel)은 기존의 CRT(Cathode Ray Tube)와 LCD(Liquid Crystal Display)에 비해 대형화가 용이하다는 장점으로 인해 차세대 디스플레이 소자로서 각광받고 있다. 그러나, 다른 디스플레이 소자에 비해 높은 소비전력과 낮은 발광효율은 지속적인 연구를 통해 개선해야할 문제점으로 지적되고 있다. 본 연구에서는 기존의 소비전력을 낮추고 발광효율 향상을 위해 기존 Stripe형태의 ITO전극구조에서 Etching공정과정을 거쳐 long gap을 가진 Square형태의 전극구조로 patterning과정을 통해 전극면적을 조절하여 discharge current제어하였다. 또한 방전유지전극간의 gap간격이 늘어남에 따라 상승하게 될 방전개시전압을 줄이기 위해 Square 전극에 (□)형태의 점화전극을 추가한 새로운 ITO전극구조를 제안하였다. 실험은 reference (conventional ITO구조)와 제안된 Square구조들로 구성되어 있는 Test Panel을 직접 제작하여 휘도, 소비전력, 발광효율을 측정하여 그 특성들을 비교하였다. 그 결과 제안된 전극구조에서 reference구조에 비해 소비전력은 최대 18% 감소하였고, 효율은 최대 13% 상승을 함을 보였다.

Structural Properties and Electronic States of Germole Compounds

Y. H. Park, Y. H. Shin, S. Y. Lee, S. J. Noh, J. W. Hyun, Yongmin Kim^{1*}, Honglae Sohn²

¹Department of Applied Physics, Dankook University

²Department of Chemistry, Chosun University

Composed of thin multilayers of hole transporting, emissive, and electron transporting (ET) materials sandwiched between two electrodes, are enjoying a great deal of interest because of their possible application as large-area flat panel displays.

One of the major current subjects in this field is the development of efficient ET materials. The efficiency of the electron injection for the devices reported so far seems to be inferior to that of the hole injection, due to the large differences between the Fermi levels of cathode metals and the LUMO levels of the ET materials. High electron affinity may thus be the first requisite for the design of ET materials. Silicon-containing cyclic π -electron system, silole (silacyclopentadiene), as a novel core component for efficient ET materials. Recently been theoretically demonstrated that the low-lying LUMO energy level of the silole ring is ascribed to the σ^* - π^* conjugation between the σ^* orbital of the exocyclic bond on silicon and the π^* orbital of the butadiene moiety in the ring. Silole ring has the lowest LUMO energy level among them. It was thus anticipated that new efficient ET materials would be realized by using the silole ring as a core component. Recently, siloles or silacyclopentadiene derivatives have been proposed as a new class of emissive materials of OLEDs. However, only limited number literatures for the synthesis and properties of germoles are available.

We carried out molecular orbital and electronic structures (HOMO and LUMO energy levels) calculations for germole compounds on the restricted Density Functional Theory (DFT) level using a B3LYP/6-31G(d) basis set, employing the Gaussian 98 suit of programs. Optical properties investigation using the photoluminescence (PL) at room temperature. The EL devices based on DHG were fabricated through thermal evaporating depositions of multiple layers onto the glass substrates. The EL spectra is similar to the PL spectra with the emission maximum located at ~ 512 nm, corresponding to greenish-blue emission from the DHG layer.