Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

The role of thin MgO(100) epilayer for polarized charge injection into top-emitting OLED[1] TAE HEE KIM, NYUN JONG LEE, YU JEONG BAE, Department of Physics, Ewha Womans University, Seoul, South Korea, HYUNDUCK CHO, CHANGHEE LEE, School of Electrical Engineering and Computer Science, Seoul National University, Seoul, South Korea, EISUKE ITO, Flucto-Order Functions Research Team, RIKEN Advanced Science Institute, Wako, Saitama 351-0198, Japan — A new top-emitting OLED (TOLED) structure, which is formed on an Si(100) substrate and an epitaxial MgO(100)/Fe(100)/MgO(100) bottom electrode, was investigated. Our TOLED design included a semi-transparent cathode Al, a stack of conventional organic electroluminescent layers (α-NPD/Alq_3/LiF) and a thin Cu-Phthalocyanine (CuPc) film to enhance the hole injection into the luminescent layers. At room temperature (RT), magnetoluminescence of $\sim$5 % was observed in low magnetic field up to 1 Tesla , which is obviously larger than that of the OLEDs with epitaxial and polycrystalline Fe anodes without MgO(100) covering layer. Our results indicate that the magnetic field effect on the electroluminescence could be strongly related to the magnetic properties of bottom electrode, more precisely the interfacial properties between CuPc layer and the anode. Therefore, we focused on understanding interface electronic states and energy alignment by using x-ray photoemission spectroscopy and ultraviolet photoemission spectroscopy. Our results showed that the use of appropriate oxide layers could represent a new interface engineering technique for improving reliability and functionality in organic semiconductor devices.

Tae Hee Kim
Department of Physics, Ewha Womans University, Seoul, South Korea

[1]This work is supported by National Research Foundation of Korea Grants (NRF-2011-0017209 and 2011-0005908).

Date submitted: 21 Nov 2011 Electronic form version 1.4