

## Organic Thin Film Transistor Fabricated with Soluble Pentacene Active Channel Layer and NiO<sub>x</sub> Electrodes

Jin-Woo Han, Young-Hwan Kim, Byoung-Yong Kim, Jeong-Min Han, Hyun-Chan Moon\*, Kwang-Bum Park\* and Dae-Shik Seo  
Yonsei University, KETI(Korea Electronic Technology Institute)\*

**Abstract :** We report on the fabrication of soluble pentacene-based thin-film transistors (TFTs) that consist of NiO<sub>x</sub>, poly-vinyl phenol (PVP), and Ni for the source-drain (S/D) electrodes, gate dielectric, and gate electrode, respectively. The NiO<sub>x</sub> S/D electrodes of which the work function is well matched to that of soluble pentacene are deposited on a soluble pentacene channel by sputter deposited of NiO powder and show a moderately low but still effective transmittance of ~65% in the visible range along with a good sheet resistance of  $\sim 40 \Omega/\square$ . The maximum saturation current of our soluble pentacene-based TFT is about  $15 \mu\text{A}$  at a gate bias of  $-40\text{V}$  showing a high field effect mobility of  $0.06 \text{cm}^2/\text{Vs}$  in the dark, and the on/off current ratio of our TFT is about  $10^4$ . It is concluded that jointly adopting NiO<sub>x</sub> for the S/D electrodes and PVP for gate dielectric realizes a high-quality soluble pentacene-based TFT.

**Key Words :** soluble pentacene, NiO<sub>x</sub>, thin film transistor