IL-12

Polyimide Gate Dielectrics for Organic Thin Film Transistor

Mi Hye Yi , Seungmoon Pyo

Advanced Materials Division, Korea Research Institute of Chemical Technology, P. O. Box 107, Yuseong, Daejeon, 305-606, Korea

Surface modification of gate insulators has been one of the key issues for a performance improvement of organic thin-film transistors (OTFTs). The modified surfaces of the gate insulators altered interactions between the organic semiconductors and the gate insulators, which affected a initial growth of the organic semiconductor on the gate insulator. Therefore, it has been believed that a well-defined interface control of the gate insulator and organic semiconductor is one of the most important parameters for a realization of stable, reliable and high performance organic thin film transistors. In this presentation, we propose a new method to achieve well-defined surface wetting properties of the polymeric gate dielectric without using a conventional SAM technique. To control the surface properties of the gate insulators, a soluble polyimide was prepared from 5-(2,5-dioxotetrahydrofuryl)-3-methyl-3-cyclohexene-1,2-dicarboxylic anhydride [DOCDA] and functional diamine, 1-(3,5-diaminophenyl)-3-octadecyl-pyrrolidine-2,5-dione [DA-L-18IM], which was introduced into the gate insulators. Performance of the pentacene thin film transistors were obtained with a filed-effect-mobility of 0.14~0.94 cm^2/Vs according to the type of the polymer components. Additionally, we had investigated a relationship between the surface properties (surface morphology, surface tension, etc) of the gate insulators and the performance of OTFTs, which will be discussed in more detail.

References

1. Pyo, S.; Lee, M. Y.; Jeon, J. J.; Lee, J. H.; Kim, J. S.; Yi, M. H. *Advanced Functional Materials*, **15**, 619 (2005).

2. Pyo, S.; Son, H. S.; Choi, K.-Y.; Hong, S.K.; Yi, M. H. *Applied Physics Letters*, **86**,133508 (2005).

3. Pyo, S.; Son, H. S.; Yi, M. H. *J. Mater. Res.* **20**, 931 (2005).