

Organic TFT 특성향상을 위한 절연막의 표면처리 및 소자 특성 변화

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Abstract : This paper focuses on improving organic thin film transistor (OTFT) characteristics by controlling the self-organization of pentacene molecules with an alignable high-dielectric-constant film. The process, based on the growth of pentacene film through high-vacuum sublimation, is a method of self-organization using ion-beam (IB) bombardment of the $\text{HfO}_2/\text{Al}_2\text{O}_3$ surface used as the gate dielectric layer. X-ray photoelectron spectroscopy indicates that the IB raises the rate of the structural anisotropy of the $\text{HfO}_2/\text{Al}_2\text{O}_3$ film, and X-ray diffraction patterns show the possibility of increasing the anisotropy to create the self-organization of pentacene molecules in the first polarized monolayer. An effective mobility of $2.3 \times 10^{-3} \text{ cm}^2 \text{ V}^{-1} \text{ s}^{-1}$ was achieved, which is significantly different from that of pentacene films that are not aligned. The proposed OTFT devices with an ultrathin HfO_2 structure as the gate dielectric layer were operated at a gate voltage lower than 5 V.

Key Words : OTFT, Ion beam irradiation, pentacene, self-organization

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