

Bias stress and memory effect in pentacene-based organic thin-film transistors with a fullerene layer

Abstract

Organic memory-transistor devices were fabricated from pentacene-based organic thin-film transistors (OTFTs) with a fullerene layer. The current-voltage (I - V) characteristics show that the fabricated OTFTs exhibit a unipolar property with p -channel characteristics. The fabricated OTFTs devices exhibit a threshold voltage shift upon the application of positive and negative bias. Under the effect of positive bias, the on state was induced and a $\Delta V_{th} = 12.9$ V was obtained. Meanwhile, the threshold voltage was reversibly shifted by $\Delta V_{th} = 9.1$ V under the effect of negative bias and the off state was induced. Upon the effect of bias, the carrier mobility of fabricated OTFTs is almost similar in both on and off states. Pentacene-based OTFTs without a fullerene layer for memory effect was demonstrated for comparison. The memory effect is mainly attributed to the fullerene layer.