

Enhanced Saturation Behavior of Organic Thin-Film Transistors with the Synthesized Photo-Reactive Polymeric Gate Insulator

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Abstract

Recently, intensive research efforts have been paid to improve the performance of OTFTs and some outstanding results surpassing those of amorphous silicon TFTs have been reported. OTFTs on plastic substrates can be an effective pixel switching and/or driving device for flexible displays. Especially, for active matrix OLEDs, OTFTs should operate in saturation regime and the pronounced saturated output characteristics must be achieved. In this article, we report that the characteristics of OTFTs can be improved by substituting hydroxyl group in PVP with photo-reactive cinnamoyl group. The synthesis details and the effects of the modified PVP on the device performance are discussed. The output characteristics of the OTFTs with the bare PVP and the UV-exposed PVP are shown in Fig.1. The device with the UV-exposed PVP provided lower output current levels than the OTFT with the bare PVP, but showed better saturation characteristics than the device with the bare PVP. The field-effect mobilities were extracted as 1.28 cm²/Vs and 0.31 cm²/Vs for the devices with the UV-exposed PVP and the bare PVP, respectively. Our current investigations are focused to optimize the UV-exposure condition for maximizing the performance of OTFTs.

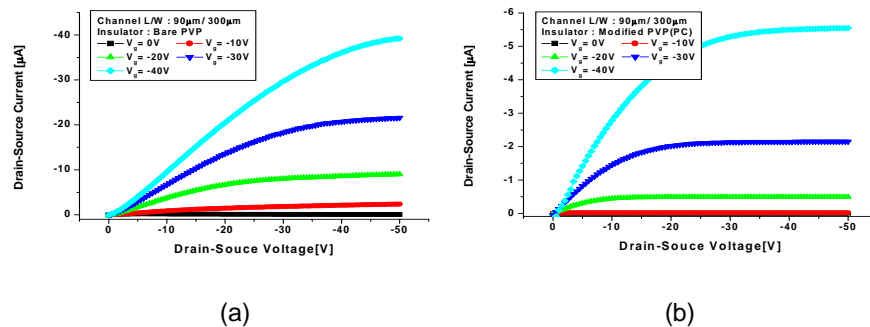


Figure 1. The output characteristics of the devices (a) with the bare PVP and (b) with the UV-exposed PC.