

Fabrication and Stability of Vacuum Deposited OTFTs

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Abstract

We have developed a process to make bottom gate top contact organic thin-film transistors (OTFTs), suitable for a roll to roll vacuum web coater environment. The vacuum based all-evaporated process allows a solvent-free deposition to make organic/inorganic multilayer structures for thin-film electronic devices on a flexible substrate, at high speed. The polymeric gate dielectric layers have been fabricated by flash evaporation of acrylic monomers onto a polymer film with pre-patterned metal gates followed by radiation curing by e-beam or plasma. With a non-polar dielectric surface, charge carrier mobility of $1\text{cm}^2/\text{Vs}$; on/off current ratio of 10^8 , sub-threshold slope of $0.3\text{V}/\text{decade}$ and saturated output curve were routinely achieved in DNTT transistors. The device showed good operational and environmental stability with no need of encapsulation. The effect of humidity, oxygen, and light during switching cycles and storage were studied.

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