Enhancing the performance of organic thin film transistor with vapor-phased interface engineering

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The efficiency of organic thin-flm transistor (oTFT) was enhanced by interface engineering between bottom-contact electrodes and semiconductor layer with an ultrathin polymeric layer deposited via initiated-chemical vapor deposition (iCVD). Poly dimethyl aminomethyl styrene (pDMAMS) is physisorbed on the various metal surfaces, and reduces the work functions (WFs) of them. Due to its universal WF-reducing property, highly reduced threshold voltages and enhanced field effect mobilities were achieved in n-channel (C60) oTFTs with various channel-electrodes. The improvements can be attributed to the significantly facilitated charge injection from the channel electrodes to the C60, and this correlates well with highly decreased contact resistance in the devices. These results demonstrate that the ultrathin iCVD polymeric layer can be universally applied to other organic electronic devices without any solvent contamination and damages of previously deposited materials.