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Transfer printed organic thin-film transistors using the semi-conductors P3HT or pentacene and a polymer dielectric. ADRIAN SOUTHARD, Physics UMD, DAN HINES, Laboratory of Physical Sciences, ELBA GOMAR-NADAL, Materials Research and Engineering Center, ELLEN WILLIAMS, Physics & MRSEC UMD, MICHAEL FUHRER, Physics and CSR at UMD — The assembly via the transfer printing process of all components for organic electronic devices onto a plastic substrate has been demonstrated. Both poly(3-hexylthiophene) (P3HT) and pentacene (Pn) have been used as active semi-conducting films for such devices without exposing the films to detrimental chemical processes. Transfer printing relies on the difference in adhesion of two substrates towards the material being transferred. Here we use the transfer printing process to fabricate organic thin-film transistors (OTFT) with a range of channel lengths. These devices are used to characterize the contact resistance for both the P3HT and Pn OTFTs. The field-effect mobility of the P3HT devices is measured to be in the range of 0.02 to 0.035 cm²/(Vs) which is comparable to the best values reported in the literature and is an order of magnitude higher than the control devices of the unprinted P3HT film as deposited onto a SiO₂ dielectric layer. These devices are demonstrated using polystyrene (PS), poly(4-vinylphenol) (PVP) and poly methyl-methacrylate (PMMA) as dielectric materials and polyethylene terephthalate (PET) as the substrate material.

Adrian Southard
Physics UMD

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