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**Tunable threshold voltage via molecular doping of solution-processed organic field-effect transistors** JAMES BELASCO, Princeton University, SWAGAT MOHAPATRA, YADONG ZHANG, STEPHEN BARLOW, SETH MARDER, Georgia Tech, ANTOINE KAHN, Princeton University — The threshold voltage, Vth, is a key parameter to control for proper circuit operation. We demonstrate the controlled tuning of Vth of solution processed, small molecule, organic field effect transistors (OFET) via molecular doping of the solution. A 1:1 blend solution containing the $\pi$-conjugated small molecule 6, 13-triisopropylsilylethynylpentacene (TIPS-pentacene) and polystyrene is used as the baseline solution for the OFETs. The organic p-dopant, molybdenum tris-[1-trifluoroethanoyl-2-trifluoromethylethane-1,2-dithiolene] [Mo(tfd-COCF3)3], a soluble version of Mo(tfd)3 [1], is added at various concentrations up to 0.3 wt% to make bottom gate, bottom contact devices by spin coating on a SiO2 dielectric. IV-measurements on the resulting devices give baseline OFETs with an average mobility of 0.5 cm2/V.s and Vth of -1.5 V, while doped OFETs show the same average mobility with Vth shifted up to an average maximum of +2.5V. Overall, the various doping levels produce a gradual increase in the threshold voltage which we attribute in part to the filling of trap states that are known to exist in organic semiconductor films [2], and in part to effects related to the organic/dielectric interface. The direct correlation between Vth and doping concentration can be used to tune the threshold voltage in this system. [1] Y. Qi et. al. J. Am. Chem. Soc. 131, 12530 (2009) [2] H. Sirringhaus et. al. Adv. Mater. 21, 3859 (2009)

James Belasco
Princeton University

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