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Defect Screening Effects of Fluoropolymer Capping in Single Walled Carbon Nanotube Transistors SEONPIL JANG, BONGJUN KIM, The University of Texas at Austin, MICHAEL GEIER, MARK HERSAM, Northwestern University, ANANTH DODABALAPUR, The University of Texas at Austin — One of the most promising uses of single walled carbon nanotubes (SWCNTs) is as active channel semiconductor materials in field-effect transistors (FETs). Recent advances in the availability of highly sorted semiconducting SWCNT source material and in printing such nanotubes to realize high-performance thin-film transistors make them very promising candidates for printed electronics. In this presentation, we report on the substantial improvements in the characteristics of SWCNT FET devices and circuits comprised of these devices by the use of coatings of the fluoropolymer containing copolymer, PVDF-TrFE. The origins of these improvements may be attributed to the polar nature of C-F bonds and the local organization of the fluoropolymer at the interfaces with the SWCNTs so as to partially neutralize charged defects. This hypothesis was tested by the experiments using a number of vapor phase polar molecules which produce similar effects on the FET characteristics. The polar vapor experiments show that dipoles can partially neutralize residual charges arising from defects/impurities. The dipole present in polar molecules adopts an orientation that tends to cancel the effects of the charged defect/impurity from the perspective of mobile charges in the SWCNTs.

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