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Solution processed large area field effect transistors from dielectrophoreticaly aligned arrays of single-walled carbon nanotubes ELIOT SILBAR, PAUL STOKES, YASHIRA M. ZAYAS-GONZALEZ, SAIFUL I. KHONDAKER, University of Central Florida, Nanoscience Technology Center and Department of Physics — Solution processed electronic devices have attracted tremendous attention because of their ease of processablity, low cost of fabrication, and their ability to cover large areas. Over the last few decades, a tremendous amount of effort has been dedicated to improve device performance of solution processed organic field effect transistors (FETs). However, despite all these efforts, typical field effect mobilities for these devices are usually on the order of ~ 0.1 cm^2/Vs, and can very rarely reach ~ 1.0 cm^2/Vs. We demonstrate solution processable large area field effect transistors (FETs) from aligned single-walled carbon nanotubes (SWNTs) arrays. Commercially available, surfactant free SWNTs suspended in aqueous solution were aligned between source and drain electrodes using AC dielectrophoresis. After removing the metallic nanotubes using electrical breakdown, the devices displayed on-off ratios up to 10^4. The devices showed p-type FET behavior with maximum field effect mobility of 27.1 cm^2/Vs, two orders of magnitude higher than solution processed organic FET devices.

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