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Separated Carbon Nanotube Macroelectronics for Active Matrix Organic Light-Emitting Diode Displays YUE FU, JIALU ZHANG, CHUAN WANG, POCHIANG CHEN, CHONGWU ZHOU, University of Southern California — Active matrix organic light-emitting diode (AMOLED) display holds great potential for the next generation visual technologies due to its high light efficiency, flexibility, lightweight, and low-temperature processing. However, suitable thin-film transistors (TFTs) are required to realize the advantages of AMOLED. Pre-separated, semiconducting enriched carbon nanotubes are excellent candidates for this purpose because of their excellent mobility, high percentage of semiconducting nanotubes, and room-temperature processing compatibility. Here we report, for the first time, the demonstration of AMOLED displays driven by separated nanotube thin-film transistors (SN-TFTs) including key technology components such as large-scale high-yield fabrication of devices with superior performance, carbon nanotube film density optimization, bilayer gate dielectric for improved substrate adhesion to the deposited nanotube film, and the demonstration of monolithically integrated AMOLED display elements with 500 pixels driven by 1000 SN-TFTs. Our approach can serve as the critical foundation for future nanotube-based thin-film display electronics.

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