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Fully Transparent Separated Carbon Nanotube Based Thin-film Transistors and their Application in Display Electronics JIALU ZHANG, CHUAN WANG, CHONGWU ZHOU, University of Southern California — Transparent electronics have attracted numerous research efforts in recent years due to its great potential to make significant commercial impact in a wide variety of areas such as transparent displays. High optical transparency as well as good electrical performance is required for this kind of applications. Pre-separated, semiconducting enriched carbon nanotubes are excellent candidates for this purpose due to their excellent mobility, high percentage of semiconducting nanotubes, and room-temperature processing compatibility. Here in this paper, we report fully transparent high-yield transistors based on separated carbon nanotube random network. High electrical performance is achieved by using large work function thin metal layer and indium-tin oxide (ITO) as contacts and all devices show excellent transparency (∼82%). Furthermore, OLED control circuit has been demonstrated with transparent separated nanotube thin-film transistors and large range output light intensity modulation has been observed. Our results suggest the promising future of separated carbon nanotube based transparent electronics and can serve as the critical foundation for the next generation transparent display applications.

Jialu Zhang
University of Southern California

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