

Carbon nanotube thin films for transparent, flexible and stretchable electronics applications

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We present the direct dry printing (DPP) manufacturing method of single walled carbon nanotube (SWNT) based transparent conducting films (TCF) for touch sensors with electrical properties on par with those of ITO-on-PET, and with optical as well as mechanical properties i.e. bendability, flexibility and stretchability better than those of ITO, metal nanowire and metal mesh touch sensors. All carbon transparent, flexible and stretchable TFT-FETs have been made using percolating SWNT network as the semiconductor and SWNT transparent conducting film as the source, drain, gate and interconnect material. SWNT networks consisting of long, clean and highly individualized SWNTs exhibit substantially improved TCF performance. We introduce SWNT thin films in 3D formable touch sensors for novel future electronics applications. We discuss the SWNT growth mechanisms during the floating catalyst chemical vapour deposition synthesis as well as their deposition mechanisms using thermophoresis. We present high mobility SWNT percolating thin film field effect transistors (TFT-FETs) made via thermophoretically deposited individual SWNTs.