

Preparation of Transparent Conductive Films with Polymer-Dispersed Single-Walled Carbon Nanotubes

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The single-walled carbon nanotubes (SWCNTs) coatings on glass and plastic film have been investigated as transparent conductive films (TCFs) to alternate indium tin oxide (ITO) films. One of important factors that makes TCF more conductive is the dispersion of SWCNTs. Here, poly[2-(dimethylamino)ethyl methacrylate]-co-polystyrene (PDMAEMA-co-PS) was synthesized and used as a polymeric dispersant for SWCNTs in organic solvent. PDMAEMA-co-PS with different copolymer compositions were prepared by atom transfer radical polymerization (ATRP). SWCNTs were effectively dispersed through non-covalent functionalization by sonication in tetrahydrofuran (THF). Especially, the stability of dispersed SWCNTs was optimized with 70 to 30 of compositions (PDMAEMA₇₀-co-PS₃₀). SWCNTs coatings on poly(ethylene terephthalate) (PET) film and glass, were prepared by spin-coating method. Heating treatments and chemical treatments were carried out as a post-treatment to decrease the sheet resistance without the change of transparency. Transmittance and sheet resistance of SWCNTs/PDMAEMA-co-PS films were obtained by UV-vis spectroscopy and four point probe measurement, respectively.