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Fabrication and test of adhesion enhanced flexible carbon nanotube transparent conducting films

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Abstract This study introduced an innovative method to fabricate flexible transparent conducting films (TCFs) by spraying single-walled carbon nanotubes (SWCNTs) solution, dispersed by sodium dodecyl benzene sulfonate (SDBS), on polyethylene terephthalate (PET) substrate. The PET substrates were pretreated with nitric acid to improve the surface hydrophilicity. The films were spray deposited on the pretreated PET substrates in a two-step spray coating method. The film conductivity was further improved by nitric acid. As a convenient process, ultrasonication resonance method was applied to test the adhesion of TCFs. Comparing with the traditional preparation method, the adhesion of TCFs was enhanced and the mechanism was analyzed. The morphologies and thicknesses of TCFs were characterized by scanning electron microscopy and atomic force microscopy, while the Raman spectroscopy confirmed the structures of SWCNTs and the thickness changes of TCFs treated with different ultrasonication time.

Keywords Nanostructures, coatings, ultrasonic techniques, adhesion

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