Poster

ELECTROCHEMICALLY GROWN PEDOT ON NANOTUBE FILMS FOR TRANSPARENT ELECTRODES

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In order to further the development of important organic electronic devices such as solar cells and LEDs, a transparent electrode material is required to replace indium tin oxide, which is rapidly decreasing in availability and poses stability problems for devices. Films of carbon nanotubes on glass or plastic substrates have shown promising conductivities and transparencies which could make them a highly suitable alternative to ITO. Poly(ethylene dioxythiophene) is a semi-transparent conductive polymer which is frequently used to aid electron transport between the electrode and active organic layers of a device, yet due to its high insolubility it is normally mixed with a nonconductive polymer such as PSS to enable processing; significantly impeding its performace. The research described here proposes the use of carbon nanotube films as a conductive scaffold on which to grow PEDOT films by electrochemical oxidation of the monomer, thus forming a pure PEDOT layer on the electrode. The resulting electrode benefits from both the high conductivity and surface area of the nanotubes, and the work function of the polymer layer, which also serves to fill the space between nanotubes. The mechanical stability and charge transport properties of the electrodes can be enhanced by covalently binding the two materials. This is achieved by functionalisation of the nanotubes with EDOT monomer prior to the formation of the electrodes, thus instigating PEDOT growth directly from the nanotube surface.