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Ion-Implanted Polyaniline thin films for radiation sensing applications

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Polymer based electronics is an emerging technology that is focused on developing electronic devices using semiconducting polymers that can potentially replace silicon based electronics. Polymer based electronics materials are relatively cheaper to synthesize and are mechanically flexible compared to silicon. Metal-polymer nanocomposites, for example, have distinctive electrical, optical and morphological properties that can be useful for device applications. However, fabrication-structure-property relationships of these materials are not yet fully understood, and this warrants further investigative studies. In this work, Polyaniline (PANI) was dissolved in dimethyl sulfoxide and spun cast on an ITO/PET substrate to obtain PANI thin films. Prepared films were then implanted with 10 keV Ti+ ions to a fluence of 5x1015 ions/cm2 to form a Ti-PANI nanocomposite material. Rutherford Backscattering Spectrometry (RBS), X-ray Diffraction (XRD), Fourier Transform Infrared Spectroscopy (FTIR), UV-Vis spectroscopy, Current-Voltage (I-V)and Capacitance-Voltage (C-V) measurements were used for structural, optical and electrical characterization of the films before and after ion implantation. This presentation describes and explains the results of the characterisation measurements, with a view to modifying material properties of Ti-PANI nanocomposites for nuclear radiation sensor applications.

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