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GAMMA- AND ELECTRON DOSE RESPONSE OF THE ELECTRICAL CONDUCTIVITY OF POLYANILINE BASED POLYMER BLENDS

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Conducting polymers, also known as “synthetic metals” have been the subject of widespread investigations over the past decade due to their very promising characteristics. Polyaniline (PANI) holds a special position among conducting polymers in that its most highly conducting doped form can be reached by protonic acid doping or oxidative doping. It was published earlier (1), that the electrical conductivity of some polyaniline based polymer composites increases to a significant extent when irradiated to gamma, electron or UV radiation.

The aim of the present study was to measure the high frequency conductivity of blended films of PANI with poly(vinylchloride), PVC, and chlorinated poly(propylene) irradiated in air to different doses. In order to find the most suitable composition of these composites the mass percentage of PANI within the PPCI and PVC matrix was changed between 5 – 30 %. These samples were then gamma irradiated and the induced electrical conductivity was measured in the 1 kHz - 1 MHz frequency range to determine the most sensitive evaluation conditions. After selecting both the most suitable measuring conditions as well as the blend compositions the dose response of the chosen samples was determined in the dose range of 10 - 250 kGy. With respect to potential dosimetry application the effect of electron irradiation, the effect of irradiation temperature and the stability of the irradiated samples have also been investigated.

References:

1. Sevil U.A., Guven O., Suzer S., Spectroscopic Investigation of Onset and Enhancement of Electrical Conductivity in PVC/PANI Composites and Blends by γ -ray or UV Irradiation, J. Phys. Chem. B 1998, 102, 3902-3905.