

Evaluating the Photo degradation of polymer nano coating systems using slow positron beam

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The degradation of polymer nano coating systems due to UV irradiation is investigated using positron annihilation spectroscopy. Doppler broadened spectra of positron annihilation are measures as a function of slow positron implantation energy from 0 to 30 keV and irradiation time up to 293 hours in a series of waterborne polyurethane zinc oxide nanocomposites(WBPU/ZnO) coating systems. The photodegradation of the nano coating is characterized in terms of sub nanometer defect changes. Significant change of The S parameter from the Doppler broadened energy spectra vs positron energy is observed. From the S parameter results, Increasing the loading of the zinc oxide nanoparticles into the WBPU coating system leads to accelerate the photodegradation process of the nanocoating. The results are presented and discussed in the frame of the variation of the free volume percentage in the nanocoating systems.