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Relaxation of Radiation Effects on the Optical Transmission of Polymers ALEXANDRA HUGHLETT, TYLER KIPPEN, JR DENNISON, Utah State University, MATERIALS PHYSICS GROUP, PHYSICS DEPARTMENT, UTAH STATE UNIVERSITY TEAM — Changes in optical transmission of polymers over time were studied to determine the factors contributing to relaxation of defect states induced by intense radiation doses. Samples of low density polyethylene (LDPE), polyether ether ketone (PEEK), polypropylene (PP), and polyimide (PI) received doses up to 500 MGy. These doses were intended to simulate long-term exposure of common spacecraft materials in geosynchronous orbit. Features and absorption edges can be related to energies associated with various defects previously observed in these highly disordered materials. Recent work has suggested that such radiation-induced defect states are sensitive to atmospheric exposure and that the radiation-induced effects would begin to relax. Upon prolonged exposure, the material would return to its original state. These findings have called in to questions the usefulness of many previous studies of radiation effects on spacecraft materials. After irradiation, transmission spectra were collected as soon as the samples were exposed to oxygen and water vapor in the atmosphere. Between irradiation and the time data collection began, the samples were stored in anaerobic environments. The spectra were collected periodically over several weeks in order to allow for accurate comparisons and to determine the relation rates and final equilibrium states.

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