

Radiation Damage and Recovery Mechanisms in Scintillating Fibers

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Optical scintillating fibers lose their transparencies when exposed to radiation. Nearly all studies of radiation damage to optical fibers so far only characterize this darkening with a single period of irradiation. Following the irradiation, fibers undergo room temperature annealing, and regain some of their transparencies. We tested the irradiation-recovery characteristics of scintillating fibers in four consecutive cycles.

In addition, three optical scintillating fibers were irradiated at 22 Gy per minute for over 15 hours, and their transmittance were measured each minute by pulsing a light source through the fibers. Here, we report on the in-situ characterization of the transmittance vs radiation exposure, allowing future applications to better predict the lifetime of the scintillating fibers.

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