Restoring Transmission of Irradiated Image Fiber Bundles

C. Chrobak\textsuperscript{1}, M.A. Van Zeeland\textsuperscript{1}, R.A. Moyer\textsuperscript{2}, and J.H. Yu\textsuperscript{2}

\textsuperscript{1}General Atomics, PO Box 85608, San Diego, California 92186-5608, USA
email address chrobak@fusion.gat.com, vanzeeland@fusion.gat.com
\textsuperscript{2}University of California San Diego, 9500 Gilman Dr., La Jolla, California 92093-0417
moyer@fusion.gat.com, j2yu@ucsd.edu

Image fiber bundles are employed in fusion experiments and other high radiation environments where they are used to transmit an image from an unprotected objective lens to a radiation shielded camera. Due to their exposure to neutron and gamma radiation the transmission of these expensive image fiber bundles can rapidly degrade, especially at the shorter visible wavelengths, and require costly replacement. A cost-effective, non-destructive heat treatment process in which entire fiber bundles are heated gradually in air to 150\textdegree C-200\textdegree C and held for a period of several days has been shown to recover as much as 90\% of the average transmission lost due to the radiation damage of the fiber bundle. The restoration process can be repeated multiple times without a loss in effectiveness, although some physical degradation of inter-fiber alignment has been observed. The results and the apparatus used for the successful restoration of the transmission of multiple image fiber bundles across their entire wavelength band will be presented.

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