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Fluorescence Efficiency and Visible Re-emission Spectrum of Tetraphenyl Butadiene Films at Extreme Ultraviolet Wavelengths VICTOR GEHMAN, STANLEY SEIBERT, ANDREW HIME, KEITH RIELAGE, YONGCHEN SUN, DONGMING MEI, JOEL MASSEN, DANIEL MOORE, MINICLEAN COLLABORATION — There are a large number of direct dark matter and neutrino detection experiments either in construction or in planning which will use the scintillation light from noble elements as a mechanism for measuring radiation deposition. This scintillation light is emitted in extreme ultraviolet (EUV, 100–200 nm) wavelengths. There are very few photon detectors directly sensitive to this wavelength that are also capable of detecting the very small number of photons expected from signal events in such detectors. The most technically feasible solution to this problem is to surround the noble element volume with a thin film of Tetraphenyl Butadiene (TPB) to act as a fluor. The TPB film shifts the EUV photons to visible photons, detectable with commercial photomultiplier tubes. Here we present a study of the fluorescence efficiency of such films as well as the shape of the visible re-emission spectral shape at several input EUV wavelengths.

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