

Light collection efficiency and “Scintillator to Fiber signal” ratio in plastic scintillation dosimetry.

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To date, the most practical dosimetry systems used in dose measurement and verification are ionization chambers (which usually must have at least a 0.1 cc air cavity volume), thermoluminescent dosimeters (TLDs), and silicone diodes. Within the last decade, there is increased interest in scintillation dosimetry using small water-equivalent plastic scintillators. While plastic scintillator detectors have many desirable dosimetric characteristics when compared with other commonly used detector systems, there is no successful commercial detector system available to the Medical Physics/Radiation Oncology community to use for routine dosimetry. The objectives of this study is to examine this new technology and identify what needs to be done to transfer this new technology from the research lab to commercial application. A definition of “Signal to Noise” ratio (S/N) will be defined for this category of detectors. The S/N ratio for several prototype designs have been calculated and/or measured. These results will be presented along with the required criteria to optimize the response and the sensitivity of this category of detectors.