

AbstractID: 1551 Title: Monte Carlo calculated dose to $\text{Al}_2\text{O}_3\text{:C}$ per unit dose to water in photon beams compared to measured OSL response per unit dose to water

Optically stimulated luminescence (OSL), used with fiber optics, is used to provide a highly sensitive detector for in-vivo dosimetry during radiotherapy. In addition to the small size of the detector, the primary advantage of this type of detector over more commonly used dosimeters is the ability to provide real-time monitoring of the dose or dose-rate during treatment. The solid-state dosimeter used in this study is made from carbon-doped aluminum oxide ($\text{Al}_2\text{O}_3\text{:C}$), and can be used either on the body surface or in cavities near the organs of interest to measure either dose-rate or total absorbed dose. Experiments show the OSL response to be linear with dose in the range 0-3 Gy. The measured response of the dosimeter per unit dose to water changes by less than 1% for a 6 MV versus an 18 MV photon beam. Monte Carlo calculations using the EGSnrc user-code, CSnrc, show that the dose to $\text{Al}_2\text{O}_3\text{:C}$ in a 2 mm^3 dosimeter per unit dose to water varies by approximately 1% over the range of 6 MV to 18 MV. This variation is on the order of 2.5% when the range of beams includes ^{60}Co . Further calculations show that on average, the dose ratio decreases by 0.5% when the volume of the dosimeter is changed from 2 mm^3 to 1 mm^3 .