

Title: Molecular disruptions in PTFE as the basis of a therapy-level skin dosimeter

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Abstract: 75 μm thick PTFE tape attracts interest, forming the basis of a potential skin dosimeter capable of utilization in radiotherapeutic external beam applications. The medium is readily available, for instance in the form of ordinary plumber's tape as used herein, typically of 12 mm width mounted on a spool. A60Co (mean energy 1.25 MeV) irradiator has been used to deliver doses in the range 0.1- to 10 Gy, with disrupted molecular bonds inspected via Raman spectrometry. The peak of greatest magnitude, at a wavenumber of $\sim 734\text{ cm}^{-1}$, corresponds to the difluoromethylene (CF_2) symmetric stretching mode. Reduction in the peak intensity is seen to occur over the range 0.1- to 5 Gy, covering the values of skin dose typically arising in a single fractionated radiotherapeutic treatment. Results from these preliminary investigations point to a technique offering viability for radiotherapy skin dosimetry, utilizing a soft, low atomic number medium of particularly low-cost, also available in hypoallergenic form.

Keywords: PTFE tape, Skin dosimetry, Radiotherapy, External beam radiation, Gamma irradiation, Raman spectroscopy

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