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PHOTOSTIMULATED THERMOLUMINESCENCE APPLICATION IN ULTRAVIOLET AND LASER RADIATION DOSIMETRY*

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1) Introduction - The photostimulated thermoluminescence (PSTL) is a technique that was developed through the study of light effects in thermoluminescent materials. In its applications are included the possibility of making high dose dosimetry, dose reavaliation, ultraviolet (UV) and laser radiation dosimetry. The objective of this work is to study the PSTL in $CaSO_4$:Dy in several UV wavelengths of interest and laser radiation. The $CaSO_4$:Dy is an extremally sensitive thermoluminescent material that has a dosimetric peak in 220 °C and is successfully used in gamma radiation dosimetry.
2) Materials and Methods - It was used the $CaSO_4$:Dy produced at IPEN in teflon pellets form. The teflon pellets were annealed at 300 °C during 15 min before the irradiations and exposure to UV light. A source of ^{60}Co with 15.0 TBq was used for sample irradiation. A system containing a Hg lamp, Bausch & Lomb SP-200, under high pressure and a Kratos GM-200 monochromator were used for UV radiation exposure. For the thermoluminescent measurement was used a TL reader Harshaw model 2000 AB with temperature range from 200 to 360 °C and heating rate of 10 °C/s.
3) Results - The PSTL response was observed for gamma irradiation from 2.58×10^{-1} C.kg^{-1} (10^3 R) to 2.58 C.kg^{-1} (10^4 R). The PSTL response dependence with light wavelenght was studied from 230 to 570 nm. The time of exposure and the wavelenght was determined in order to obtain better resolution. The PSTL response linearity with exposure time for light wavelenght it was verified.
4) Conclusions - The obtained results show that $CaSO_4$:Dy teflon pellets presents a good performance to PSTL to be used in UV and laser dosimetry.

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STUDY FOR THE CALIBRATION OF A 30 CM ^{3} SPHERICAL CHAMBER TO BE USED WITH DIAGNOSTIC X-RAY BEAMS

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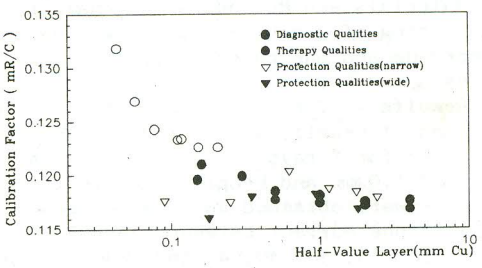
Introduction There is an increasing demand for calibration of dosemeters used in diagnostic radiology studies. LNMRI/IRD has not yet the capability of offering such calibrations due to lack of a standard calibrated at a primary laboratory for adequate diagnostic beam qualities. In order to overcome this shortcoming, specially at lower energies, a study was conducted of the energy response of an ionisation chamber designed for measurements in X-ray beam qualities at radiation protection level.

Materials and Methods Diagnostic beam qualities of half-value layers (HVL) from 0.045 to 0.231 mm Cu (40 to 150 kVp) implemented in a Siemens Stabilipan X-ray tube, were used for calibration of a 30 cm^3 spherical ion chamber (OFS TK30) in a 10 cm diameter field size, at 1 m from the tube target. A 0.325 cm^3 thimble ion chamber (NE 2561), calibrated at the National Physical Laboratory (NPL) for therapy beam qualities, was used as a standard whose calibration factors were interpolated according to the diagnostic beam HVL. TK30 chamber's calibration factors previously obtained against different standards, for beam qualities at therapy and radiation protection levels, were also analysed.



Results The figure shows that results obtained for diagnostic qualities indicate a large (12%) energy response in the range of interest (HVL up to 0.231 mm Cu) while those obtained with harder beams indicate a linear response, within ± 2%, down to 0.09 mm Cu HVL, confirming that the chamber is designed with compensation for such beams. For this latter HVL, calibration factors obtained against two different standards differ by 5%. Both sets of results show that calibration of the spherical ion chamber at adequate diagnostic qualities is necessary if measurement uncertainties are to be kept smaller than 5%.

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