centers than single crystal. In addition, if storage phosphor is transparent, photodetectors can detect photons emitted from not only surface but also inside of the materials. Therefore, storage phosphors using transparent ceramics expect to have the outstanding dosimetric properties comparing to the one using single crystal and opaque ceramics.

In this study, we focused on LiCl for host material. LiCl would be appropriate to storage phosphor for personal dosimeter because the Zeff of LiCl (16.7) is similar to that of human soft tissue. In addition, the Zeff of LiCl is lower value than CaF2 (~16.9), which are the host materials of the commercial dosimeters. As a luminescence center, we focused on Eu2+ ions. In previous research about photoluminescence (PL) of Eu-doped LiCl, the emission peak was observed at 440 nm, which is suitable for the wavelength sensitivity of common photodetectors. For above the reasons, we fabricated undoped and Eu-doped LiCl transparent ceramics and evaluated the photoluminescence and dosimetric properties.

As result of OSL properties of 0.1, 0.5, and 1.0% Eu-doped LiCl transparent ceramics, after X-ray irradiation, all the samples had the emission peaks at 440 nm under the stimulation wavelength at 490 nm. The emission origin was due to the 5d-4f transitions of Eu2+ ions. In addition, OSL dose response functions showed the linear response from 1 mGy to 1 Gy for 0.5 and 1.0% Eu-doped samples and from 10 mGy to 1 Gy for 0.1% Eu-doped sample.

ID_162

Title of the abstract: Calibration of 90Sr + 90Y planar sources using thermoluminescent samples, a PMMA phantom and Monte Carlo simulation

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Abstract: In certain regions of Brazil, 90Sr/90Y clinical applicators continue to be employed for dermatological and ophthalmic treatments, even though newer technologies, such as the 106Ru/106Rh Eye Applicator, are available worldwide. The use of these older applicators persists due to their lower cost and greater ease of use. However, it is crucial to calibrate and periodically recalibrate these applicators to ensure that the absorbed dose rates are accurate, and that the quality of clinical treatments is maintained. This study examines the thermoluminescent response of μLiF pellets to evaluate their reproducibility, linearity of response, and dose-response curves. Two radiation systems were used to characterize the dosimetric material. The first system is part of a Risö reader system (Risö TL/OSL-DA-200 model) with a 90Sr/90Y source, operating at a dose rate of 0.1 Gy/s (2010). The second system is a 90Sr/90Y source from the beta secondary standard system (BSS2) with a dose rate of 123.32 μGy/s (2005), from Amersham Buchler, calibrated in the German Primary Standard Laboratory, Physikalisch-Technische Bundesanstalt (PTB). The BSS2 system presents its calibration certificate in air and in ICRU 4-element tissue (k=2). The uncertainties in the thermoluminescent measurements for some measurement cycles of μLiF samples, irradiated with 1 Gy of beta radiation, Risö system, remained up to 5%. Linearity and dose-response curves were obtained over a dose range from 0.3 to 1 Gy using the BSS2 system. The R2 values for the μLiF samples ranged from 0.9974 to 0.9998. The dose rates for three clinical applicators were determined using μLiF pellets, a PMMA phantom, and the Monte Carlo method. This project followed the guidelines outlined in ISO 21439 (2009), which recommends the use of small detectors like μLiF for this type of calibration. Monte Carlo simulation was used to determine correction factors between absorbed dose in air, water, and PMMA, ensuring the use of PMMA in clinical applicator calibration. The PMMA has a cubic shape, a slot to

keep the μLiF at a one-millimeter depth, and dimensions that ensure total absorption of beta radiation without interaction with air. The percentage differences between the μLiF calibration and the manufacturer calibration values were equal to or greater than 10%. The main reasons for these results are discussed in this work.

ID_164

Title of the abstract: Numerical dosimetry in proton therapy of prostate cancer using a realístico virtual anthropomorphic phantom

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Abstract: The objective of radiotherapy is to deliver the prescribed radiation dose to a tumor, with the lowest possible dose to adjacent healthy tissues. Compared to conventional photon-beam radiotherapy, protontherapy reduces the full therapeutic dose required for local control in patients with prostate cancer, ensuring an associated decrease in the incidence of radiogenic secondary cancers, originated by secondary neutrons received in the patient's organs located outside the treatment field. The main objective of this study is to evaluate the exposure of a patient undergoing proton beam therapy for prostate cancer. Exposure scenarios, containing an ICRP 110 reference adult virtual anthropomorphic phantom and a 231 MeV proton beam were incorporated into the MCNPX 2.7.0 radiation transport code. The highest H/D values were estimated for organs located close to the target organ that are directly exposed to the neutrons generated in the proton beam line, for example, bladder (37 mSv/Gy), small intestine (32 mSv/Gy), stomach (19 mSv/Gy) and gonads (18 mSv/Gy). A factor of 10 in the equivalent dose is observed between these organs and those further (salivary glands, lungs, and brain) from the treatment field. The estimated effective dose per therapeutic dose (E/D) was 8.3 mSv/Gy, with neutrons being the main contributors (6.4 mSv/Gy), followed by protons (1.7 mSv/Gy) and photons (0. 14 mSv/Gy). These simulated results are in good agreement with theoretical data and experimental measurements published in literature and, therefore, the computational model of proton prostate therapy exposure can be considered representative.