is currently in use at the European Organisation for Nuclear Research (CERN), where commercial FD7 glass rod RPL dosimeters (GD-301) produced by Chiyoda Technol (Japan) are used in combination with a custom readout system for passive dose monitoring of several experimental areas of the accelerator complex. At CERN, dosimeters are typically exposed to mixed radiation fields, and absorb doses up to several MGy over service time . New testing methodologies and approaches to this research topic are currently being developed at the Hubert Curien Laboratory, in the scope of the CERN-UJM (University Jean Monnet) collaboration agreement, to deepen the understanding of radiation-induced phenomena for applications exceeding the usual RPL range. At first, on-line attenuation of multi-wavelength light passing through RPL dosimeters is evaluated as a relevant quantity. A new set-up has been developed for the on-line measurement of Radiation Induced Attenuation (RIA), a quantity generally used to evaluate the radiation response of optical materials. First irradiations have been successfully performed up to doses in the tens of kGy range, using commercial X-ray sources available at UJM. Recent tests demonstrate the feasibility of the measurement and evidence a relevant signal attenuation due to the production of color centers at high doses. A similar set-up is used to further characterize RPL dosimeters irradiated in experimental areas of the CERN accelerator complex. These first promising results, to be coupled with additional measurements currently being explored, encourage further investigations. For example, higher doses, dose rate effects, signal kinetic during and after irradiation and the temperature dependence of the RIA and of the RPL signal are targeted, taking advantage of the possibilities offered by our in-house X-ray sources. Abstract

ID_218

Title of the abstract: Phototransferred thermoluminescence in commercial dosimeters after exposure to beta radiation: PTTL signal as a function of variation of the illumination time and wavelength

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Abstract: Radiation dosimetry allows the analysis of the energy deposited in a material to evaluate the effect caused on this material; it can be done using different radiation detectors, and there are several dosimetric materials that can be employed, according to the radiation kind and the purpose of its application. A material can only be considered a radiation dosimeter if it presents certain conditions; for dosimeters that present luminescent response, it is necessary to present specific characteristics in this luminescence signal. However, there are ways to study the signal to allow the response obtained to provide these characteristics, for example, studying the phenomenon of phototransfer of the luminescent signal of a material. The main objective of this work was to analyze the occurrence of phototransfer on the thermoluminescence (TL) of different commercial dosimeters, the phenomenon of the phototransferred TL (PTTL). For this, the TL and PTTL responses of LiF:Mg,Ti (TLD-100), CaF2:Dy (TLD-200), CaF2:Mn (TLD-400) and CaSO4:Dy (TLD-900) dosimeters were investigated using the 90Sr+90Y source of the TL/OSL reader system Risø. During the TL/PTTL measurements, performed with the same reader, the maximum temperatures were 350°C (TLD-200), 400°C (TLD-100 e -900) e 450°C (TLD-400), and the heating rate was kept constant at 10°C/s. The first step was to verify the TL response of the materials, by means of the TL emission curves after irradiation (with absorbed doses of 0.7 Gy for TLD-100 and TLD-900, 20 Gy for TLD-200 and 50 Gy for TLD-400). The main peaks were observed at the temperatures

of 252°C for TLD-100, 312°C for TLD-200, 398°C for TLD-400 e 226°C for TLD-900. The second step was to analyze the TL response after irradiation and a thermal treatment post-irradiation (TTPI) of 280°C/15 min for TLD-100 e TLD-900, 300°C/15 min for TLD-200 and 400°C/15 min for TLD-400; the highest TL emission occurred at 362°C (TLD-100), 139°C (TLD-200), 398°C (TLD-400) and 397°C (TLD-900). The third step was the verification of the PTTL signal, obtained after irradiation, TTPI and illumination (with UV leds) of the materials at the conditions of 265 nm/5 min for TLD-100 and 365 nm/5 min for TLD-200, TLD-400 e TLD-900. For TLD-100, a PTTL signal was verified, because two new peaks emerged at 133°C and 261°C; for TLD-200 and TLD-400 no PTTL signal was observed; for TLD-900 it was possible to obtain a PTTL response once a peak appeared at 197°C, which did not exist after irradiation and TTPI (second step). In order to continue studying the PTTL signal, this response was verified varying the illumination time for the four materials between 2.5 min and 25 min. The PTTL response maximum was observed for 15 min illumination for all the materials. The PTTL was also studied in function of the wavelength for 265 nm, 310 nm, 365 nm, 400 nm e 420 nm; the results showed that the most intense signal occurred at 265 nm for TLD-100, -400 and -900, and 365 nm for TLD-200.

ID_219

Title of the abstract: Characteristics of ZnO film for real-time X-ray radiation dosimetry

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Abstract: Radiation dosimetry refers to the study of detection and measurement of ionizing radiation dose. In active radiation dosimetry one uses a material and electronic circuitry to measure ionizing radiation dose in real-time. Here we report X-ray radiation sensing characteristics of ZnO films of different thicknesses and explore its potential for measurement of X-ray radiation dose at real-time. The films are coated on glass substrates using a sol-gel spin coating technique. Measurements of current-voltage (I-V) characteristics reveal that the resistivity of the device under X-ray radiation decreases ~10 times than the corresponding value under dark condition. The signal-to-noise ratio of the device is found to vary with the bias voltage as well as thickness of the ZnO layer. The dose rate response of the device is studied by increasing the dose rate of the X-ray source from 0.015 to 0.293 Gy/s at a constant bias voltage. The device shows a sublinear response within the given dose rates. The device is also tested to be visible blind between 370 and 700 nm and the response time is found to be less than 1 s. All these features encourage potential application of ZnO film for active radiation dosimetry.

ID_221

Title of the abstract: Computational and experimental analyses on the origin of TL and OSL signals in undoped and doped compounds

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Abstract: The main objective of this work is to present the current knowledge concerning the origin of the luminescent signal generated through Thermoluminescence (TL) and Optically Stimulated Luminescence (OSL) techniques in well-known compounds. The discussion about this mechanism involves experimental