

# Study of the Dosimetric Properties of CaSO<sub>4</sub>:Dy using OSL technique

Gasparian, P.B.R.<sup>(1)</sup>, Yoshimura, E.M.<sup>(2)</sup>, Umisedo, N.K.<sup>(2)</sup>, Campos, L.L.<sup>(1)</sup>, and  
Malthez A.L.M.C.<sup>(3)</sup>

(1) Instituto de Pesquisas Energéticas e Nucleares – IPEN/CNEN, Av. Prof. Lineu Prestes, 2242, Cidade Universitária, São Paulo, SP, Brazil

(2) Institute of Physics, University of São Paulo, Rua do Matão 1371, CEP 05508-090 São Paulo, Brazil

(3) Federal University of Technology – Parana, Av. Desembargador Westphalen, 637, Bloco N, Physics Academic Department, CEP 80010-110 Curitiba, PR, Brazil

Calcium sulfate phosphor doped with dysprosium has been used for personal dosimetry using thermoluminescence (TL) technique for decades and its TL properties are well-known [1]. In fact, TL properties of CaSO<sub>4</sub> with different impurities have been extensively studied [2-5]. V.Guckan et al. [6] investigated the optically stimulated luminescence (OSL) dosimetric properties of CaSO<sub>4</sub>:Eu and Junot et. al studied the potencial of new CaSO<sub>4</sub> based detectors with different combination of impurities, using TL and OSL techniques [7]. However, there is a lack of essential informations of OSL signal from CaSO<sub>4</sub>:Dy, as, for example, dose response and correlation between OSL and TL intensities. The aim of this study was to investigate the dosimetric properties of Calcium sulfate doped with dysprosium using OSL technique and to evaluate the possibility of its usage as OSL dosimeter.

The present study was carried using CaSO<sub>4</sub>:Dy pellets prepared in IPEN irradiated and read in TL/OSL Risoe Reader with blue light stimulation and Hoya U-340 filter. OSL dosimetric properties essentially dose response, reproducibility and fading characteristics were evaluated. Moreover, TL and OSL signals were compared to study the correlation between OSL signal and TL peaks. CaSO<sub>4</sub>:Dy OSL response is linear from 1 to 5 Gy, shows reproducibility lower than 3% and while the lower TL peak is unstable, the OSL signal seems to be associated with higher temperature peaks.

*Keywords:* optically stimulated luminescence, dosimetry, CaSO<sub>4</sub>:Dy

[1] L.L. Campos, M.F. Lima. Radiation Protection Dosimetry 14, 1986, 333-335.

[2] M. A. P. Chagas, M. G. Nunes, L.L. Campos, D.N. Souza. Radiation Measurements, 45, 2010, 550-552.

[3] T. Yamashita, N. Nada, H. Onishi, S. Kitamura, Health Physics 21 (2), 1971, 295-300.

[4] S. Bahl, S.P. Lochab, P. Kumar, Radiat. Phys. Chem., 119, 2016, 136-141.

[5] M. G. Nunes, L.L. Campos, Revista Brasileira de Física Médica, 6, 2012, 159-162.

[6] V. Guckan, V. Altunal, N. Nur, T. Depci, A. Ozdemir, K. Kurt, Y. Yu, I. Yegingil, Z. Yegingil. Nuclear Instruments and Methods in Physics Research B 407, 2017, 145-154.

[7] D.O Junot, A. G. M. Santos, L.V.E. Caldas, D.N. Souza, Internacional Conference on Luminescence (ICL), João Pessoa, Book of Abstracts, 2017.