Optical Stimulated luminescence from Citrine for High-Doses Dosimetry

Maria Ines Teixeira[a,b], Linda V.E. Caldas[a]

[a]Instituto de Pesquisas Energéticas e Nucleares, IPEN – CNEN/SP, Sao Paulo - Sao Paulo, Brazil

[b]Centro Universitário SENAC - Tiradentes/SP, Sao Paulo - Sao Paulo, Brazil

Abstract. In the sterilization of medical and pharmaceutical products, food and flower preservation, and treatment of electrical cables and al-treatments of different materials is used the irradiation process by high-doses because it presents advantages varies.Several Brazilian stone samples were already studied at IPEN for use in radiation dosimetry, using the techniques of thermoluminescence (TL), optical absorption (AO) and optically stimulated luminescence (OSL). Different kinds of glasses and sand from Brazilian beaches were studied at IPEN and showed favorable characteristics for their use for high-dose dosimetry. The possibility of using semi-precious stones from Brazilian as topaz, amethyst and jasper, and jade samples from different parts of the world, have been studied and tested at IPEN, using the technique of thermoluminescence. The objective of this work was to study citrine samples for application in high-dose dosimetry, using the OSL technique. The thermal treatment for reutilization of the materials was 300^{o}C during 1h in an unsealed oven. The samples were irradiated using a Gamma Cell-220 system of ^{60}Co (dose rate of 1.47 kGy/h), with doses from 50 Gy up to 300 kGy. The reproducibility of the OSL response presented a maximum variation coefficient of 5.7%. The lower detection limit was obtained as 350 mGy for the citrine pellets. The results show that the OSL detectors based on citrine may be useful for high-dose dosimetry in industrial processes and in the sterilization process of materials in hospitals.