Thermoluminescence of olivine from Brazil.

PEDRO OCTAVIO LARDARO[1], Alexia Oliveira Silva[1], Matheus Cavalcanti dos Santos Nunes[2], Elisabeth Mateus Yoshimura[3], Carina Ulsen[4], Neilo Marcos Trindade[4,5], Roseli Kunzel[6]

[1]Federal Institute of São Paulo (*Física*) , [2]Universidade Estadual Paulista (*Instituto de Ciência e Tecnologia*) , [3]Univeristy of São Paulo (*Física*) , [4]Univeristy of São Paulo, [5]Federal Institute of São Paulo (*Física*) , [6]Universidade Federal de São Paulo (*Departamento de Física*)

e-mail: pedrolardaro@gmail.com

Olivine is a magnesium iron silicate with the chemical formula ($(Mg^{2+}, Fe^{2+})_2SiO_4$). Olivine account for approximately 1.5% Earth's crust volume[1]. Dosimetry is the measurement and the calculation of the ionizing radiation absorbed dose by a material. One of the most used techniques in dosimetry is thermoluminescence (TL), on which this work is based[2]. TL is a phenomenon that occurs in semiconductors or insulators that had been previously exposed to ionizing radiation, which emit light when stimulated by a thermal energy[2]. This research investigates TL response of olivine under different radiation sources, beta and X-ray, in order to develop a detector that is innovative and commercially accessible. The samples were powdered with granulometry <75µm. The samples were irradiated with a beta source $^{90}Sr/^{90}Y$ (with total dose range between 5 to 10 Gy); or by an X-ray source (Moxtek 50kV Cabled). TL measurements were performed with a Risø reader (model DA-20) or in a homemade system, LUMI22, developed by the Lumidosi group at Federal Institute of São Paulo. In addition, the composition of olivine was analyzed by scanning electron microscopy (SEM)/ energy-dispersive X-ray spectroscopy (EDS) and X-ray Fluorescence (XRF). The preliminary results shown 5 TL glow peaks, the last one, the most intense centered ~ 300ºC (1 ºC/s). To verify its dosimetric properties, measurements as repeatability, reproducibility, and fading were taken.

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