

Synthetic un-doped and doped CaSiO₃ Polycrystal for Thermal Neutron Detection

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Many natural or laboratory produced silicate crystals are sensitive TL materials. In this work, synthetic polycrystals of CaSiO₃ and CdSiO₃ have been produced for investigation as gamma and neutron detector. Some of them were doped with Cd, B, Eu and Dy having in mind thermal neutrons detection. For very low dose dosimetry Cs-137, 662 keV gamma rays have shown that mGy doses can be detected. Hence, they can be used in monitoring radiotherapy or in nuclear medicine. These detectors responds well to high to very high dose radiation. Since Cd, B, Eu and Dy have large (n, γ) cross section for thermal neutrons CaSiO₃ doped with 1000 ppm Eu, 135 ppm B, 392 ppm Cd and 500 ppm Dy were produced. They were then irradiated with thermal neutron with various fluences at the research reactor IEA-R1 of the Institute for Energy and Nuclear Researches, São Paulo. Except for Eu doped CaSiO₃, all the others presented glow curves with TL peaks at 110-130, 240-250 and 375 °C. The second peak is the prominent one. It is interesting to note that doped or non-doped except for Eu doped sample, all of them presented relatively close responses to both γ -rays and thermal neutron. Eu doped calcium silicate detector presented also three peaks but at 150, 235 and 375 °C, the last one being prominent one. Mechanism of the interaction of neutrons and detectors will be discussed at the meeting.

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