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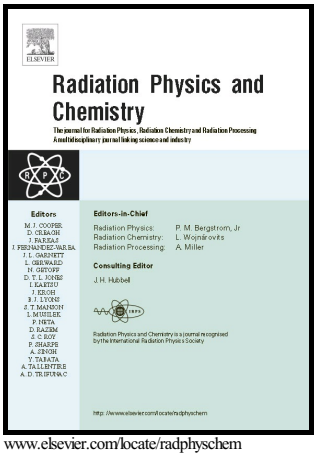

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Abstract

The influence of co-dopant Na_2O on the thermoluminescence (TL) properties and kinetic parameters of Cu_2O doped Calcium Lithium borate glass (CLB:Cu) are comprehensively examined

and studied in this paper. The glasses were prepared by melt quenching method upon adding various Na_2O concentrations of 0.1% to 1 mol%, and irradiated with ^{60}CO gamma-ray, 6MeV electron and 6MV X-ray photon. The glow curve exhibits a prominent peak (T_M) at 188^oC. The TL intensity and sensitivity was enhanced by a factor of **2** and **1.7** respectively due to the incorporation of Na_2O, and this was attributed to the creation of extra electron traps mediated by radiative recombination energy transfer. We achieved good linearity of the TL yield with dose low fading, excellent reproducibility and a promising effective atomic number (Z_{eff} =8.85), all of which are highly suitable for dosimetry. The effects of sunlight on the TL are also tested and investigated. These attractive features demonstrate that our dosimeter is useful in personal, environmental and medical radiation therapy application.

Keywords*:* Dosimetric properties. Glow curve. Borate glass. Sodium oxide. Copper oxide.Thermoluminescence dosimetry.

1. Introduction

Human beings have created many new radiation sources in the past five decades to improve the quality of our daily life. Although the benefits of radiation are tremendous nowadays, it can be considered as a severe danger and may cause cancer and genetic defects. Therefore, the personal, environmental and medical dosimetry is an important issue in safety and health care measures that makes it a valuable field of scientific research. In these applications, normally radiation with very low doses or dose rate, need to be measured and to be in a fast, simple and easy way. Environmental dosimetry is a demanding activity to detect and measure doses in response to complex, variable and usually weak radiation fields of natural or artificial origin. These conditions constitute a permanent challenge for TL dosimetry.

The choice of the type of dosimetry material is normally based on some specific characteristics that all TL dosimeters are expected to fulfill. These specific features can be summarized as, the material must have high sensitivity , it should have a low rate of fading property which means the ability to store dosimetric information for a long time; a thermoluminescence dosimeter should give a simple and single glow peak around (180-250°C), linearity between dose and TL response; should have effective atomic number close to that of the human tissue for thermoluminescence dosimeter that is used in personnel and