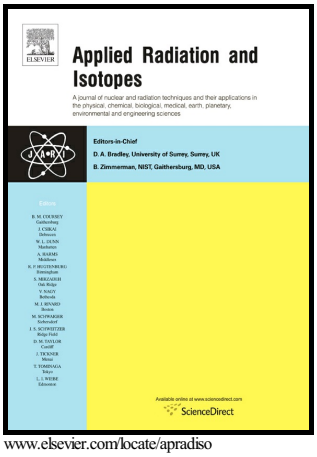

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TL and OSL dose response and stability properties of various commercially glass samples obtained from Turkey for dosimetric purposes in the UV emission spectral region

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Abstract

This paper reports Thermoluminescence (TL) and Optically Stimulated Luminescence (OSL) dose response characteristics of ten different commercial glass samples collected from Turkey. Nowadays, glass samples are widely used mostly in objects of everyday life. The study focuses to both TL and OSL dose responses, through a dose region within 1 and 512 Gy. Lowest detectable dose limit (LDDL) as well as the respective linearity features of the corresponding dose response curves were studied for both TL and OSL. Moreover, signal reproducibility and fading behaviors have also been studied in detail. For specific samples, the lowest detectable dose was yielded at 2 Gy, making thus these samples appropriate for retrospective dosimetry applications. Nevertheless, based on the features reported in the present study, the majority of the samples could be possibly used effectively for dosimetric applications of higher doses in the UV region emission.

Keywords: Glass, OSL, TL, retrospective dosimetry, dose response, linearity, LDDL

1. Introduction

Luminescence, in both terms of thermoluminescence (TL) and optically stimulated luminescence (OSL) stands as a well-established method for measuring dose values trustworthy (Bøtter-Jensen et al., 2003). Retrospective dosimetry using luminescence is based on the dosimetric behaviors of naturally occurred widespread inorganic materials such as quartz, feldspar, calcite, apatite and so on (Aitken, 1998). Quartz and feldspars stand among the most thoroughly studied materials for retrospective dosimetry studies and applications so far. The dosimetric characteristics of any luminescence material mainly depend on a number of related parameters, including the energy response, the stability and the kinetic parameters quantitatively describing the trapping-emitting centers responsible for any type of luminescence emission (Aydaş et al., 2016). Nevertheless, the dose response still stands among the cornerstone features towards dosimetric characterization of any phosphor.

Dealing with glass, with the basic component of most glasses being amorphous silica, it is well established that similar defects are present in both the crystalline and