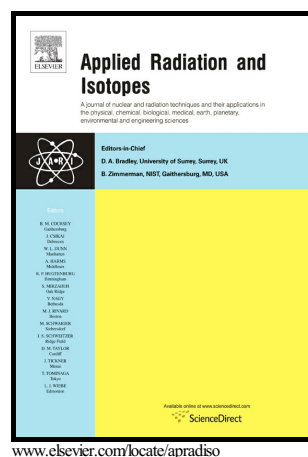


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The effect of pre-dose on thermally and optically stimulated luminescence from α -Al₂O₃:C,Mg and α -Al₂O₃:C

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Abstract

We report the effect of pre-dose on the thermoluminescence (TL) and optically stimulated luminescence (OSL) dose response of α -Al₂O₃:C,Mg and α -Al₂O₃:C. Before any luminescence measurement, the samples were irradiated with different doses, namely 100, 500 and 1000 Gy to populate the deep electron traps. This is the pre-dose. The results from TL and OSL studies are compared with results from samples used without any pre-measurement dose. The TL glow curves and OSL decay curves of α -Al₂O₃:C,Mg recorded after pre-doses of 100, 500 and 1000 Gy are identical to those from a sample used without any pre-dose. Further, the TL and OSL dose response of all α -Al₂O₃:C,Mg samples are similar regardless of pre-dose. In comparison, the TL glow curves and OSL decay curves of α -Al₂O₃:C are influenced by pre-dose. We conclude that the differences in the TL and OSL dose response of various pre-dosed samples of α -Al₂O₃:C are due to the concentration of charge in the deep traps. On the other hand, owing to the lower concentration of such deep traps in α -Al₂O₃:C,Mg, the TL or OSL dose responses are not affected by pre-dose in this material.

Keywords: α -Al₂O₃:C,Mg; α -Al₂O₃:C; Thermoluminescence; Optically stimulated luminescence; Deep traps; Sensitivity

1. Introduction

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