

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Athermal fading of luminescence in Al₂O₃ ceramic substrates IAN TERRY, EFTYCHIA KOUROUKLA, IAN K. BAILIFF, University of Durham — Retrospective dosimetry aims to reconstruct ionising radiation dose to populations following a radiological incident using materials not designed for that purpose. Sintered alumina ceramic can function as a dosimeter with its luminescence properties and related trapped charge storage mechanism. Its widespread use as a substrate in surface mount devices and incorporation in devices such as mobile phones make it a ubiquitous potential dosimeter. We investigated the optically (OSL) and thermally (TL) stimulated luminescence properties of sintered alumina substrates. In contrast to their single crystal analogue developed for personal dosimetry, Al₂O₃:C, the substrates exhibit a significant loss of trapped charge (fading) within hours following irradiation at RT that seriously limits their utility for dosimetry over an extended timescale. The fading rates of OSL and TL signals of 0402 resistors were analysed under various storage conditions (time and temperature), complemented by a study of their microstructure. The results support a model of athermal loss of trapped charge due to electron tunnelling from trapping states; this contrasting behaviour is attributed to a physical modification of the trap environment arising from the manufacturing process.

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Date submitted: 14 Nov 2014

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