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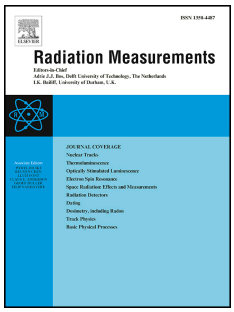

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Takumi Kato, Go Okada, Takayuki Yanagida

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Dosimetric Properties of Y-doped MgO Transparent Ceramics

Takumi Kato, Go Okada and Takayuki Yanagida

Nara Institute of Science and Technology (NAIST)
8916-5 Takayama-cho, Ikoma-shi, Nara 630-0192, Japan
Phone:+81-743-72-6144 Email: kato.takumi.ki5@ms.nasit.jp

Abstract

We have prepared Y-doped (0.001, 0.01 and 0.1 %) MgO samples by using a Spark Plasma Sintering (SPS) method. Subsequently, photoluminescence (PL), scintillation and thermally-stimulated luminescence (TSL) dosimetric properties were investigated. The PL emission peak appeared around 410 nm in all the samples. The PL decay time constants at 410 nm were ~10 and ~100 ns which were on the typical order of the emission from F^+ centers in the undoped MgO. Scintillation emission peaks were detected at 330, 400 and 760 nm under X-rays irradiations. Compared with TSL glow curve of undoped MgO, a glow peak around 140 °C shifted to high temperature in proportion to dopant concentration, and it was shown at 152 °C in 0.1% Y-doped sample. The TSL response was confirmed to be linear to the irradiation dose over the dose range from 0.1 to 1000 mGy.

Keywords: transparent ceramic, MgO, Y ions, scintillator, dosimeter, TSL