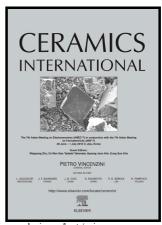
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ACCEPTED MANUSCRIPT

Scintillation, TSL and RPL properties of MgF₂ transparent ceramic and single crystal

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Abstract

We have prepared MgF_2 transparent ceramics by spark plasma sintering (SPS) and investigated the scintillation and dosimeter properties compared with those of a single crystal. Under X-ray irradiation, a transparent ceramic showed scintillation with a broad feature over 300-600 nm with decay times of 310 and 1940 μ s while the single crystal did not show such emission. It was found that MgF_2 show radio-photoluminescence (RPL), which is a generation of new luminescence center by ionizing radiation. The RPL was only observed in the transparent ceramic samples, which appeared as two emission bands peaking around 415 and 700 nm under 340 \pm 40 nm excitation. During the PL reading, the emission band at 415 nm effectively increased over 50 sec. This result suggested that the RPL in MgF_2 shows a build-up phenomenon. From PL emission/excitation characteristics and decay time, it was suggested that the RPL peak around 415 nm was due to $M(C_{2h})$ center.

Keywords: Transparent Ceramic, MgF₂, Scintillator, Dosimeter, Single Crystal

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