

# Eu concentration effects on radio-photoluminescence properties of Eu: NaSrPO<sub>4</sub> ceramics

Ibuki Uchida<sup>1,#</sup>, Daiki Shiratori<sup>1</sup>, Go Okada<sup>2</sup>, Kensei Ichiba<sup>3</sup>, Daisuke Nakauchi<sup>4</sup>,  
Yutaka Fukuchi<sup>1</sup>, Takayuki Yanagida<sup>4</sup>

<sup>1</sup>Tokyo University of Science, <sup>2</sup>Kanazawa Institute of Technology, <sup>3</sup>Kansai University  
<sup>4</sup>Nara Institute of Science and Technology

Radio-photoluminescence (RPL) is a phenomenon where the number of radiation-induced luminescence centers is proportional to the absorbed dose, making it possible to estimate the radiation dose by measuring the luminescence intensity. In recent years, RPL has been expected to find applications not only in radiation dosimetry but also in optical memory devices and high-resolution radiation imaging. Unlike dosimeters using thermally stimulated luminescence (TSL) or optically stimulated luminescence (OSL), RPL dosimeters have the advantage of being able to be read repeatedly while retaining the exposure information. However, the variety of materials exhibiting RPL is limited, and the search for high-performance materials is required. We have previously reported on the excellent RPL properties of Eu-doped NaCaPO<sub>4</sub>. In this study, we evaluated the RPL properties of NaSrPO<sub>4</sub> ceramics, in which Ca was substituted with Sr.

Figures 1 and 2 show the photoluminescence (PL) spectrum of the 0.3 % Eu-doped sample before and after X-ray irradiation. Before irradiation, emission derived from the 4*f*-4*f* transition of Eu<sup>3+</sup> ions was observed at an emission wavelength of 615 nm with an excitation wavelength of 394 nm (Fig. 1). In contrast, after irradiation, a new emission band attributed to Eu<sup>2+</sup> appeared at 450 nm under excitation at 280 and 340 nm (Fig. 2). This result suggests RPL centers were likely generated by X-ray irradiation, as evidenced by the characteristic emission appearing under 340 nm excitation. In this presentation, we report on the RPL properties in detail, including the dependence on Eu concentration.

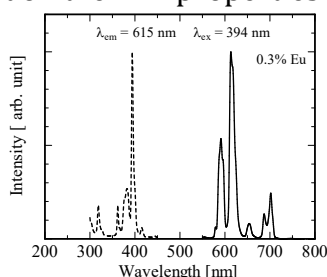


Figure 1 PL spectrum of 0.3% Eu-doped NaSrPO<sub>4</sub> ceramic before X-ray irradiation.

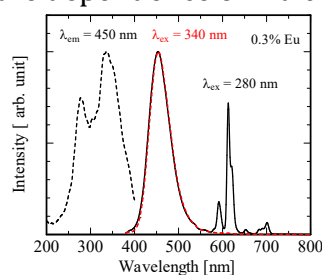


Figure 2 PL spectrum of 0.3% Eu-doped NaSrPO<sub>4</sub> ceramic after X-ray irradiation.

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# corresponding author: Ibuki Uchida: 4325513@ed.tus.ac.jp