Comparative study of optical properties of LTGA and SNGS crystals

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LTGA (La₃Ta₀.₅Ga₅.₃Al₀.₂O₁₄) and SNGS (Sr₃NbGa₃Si₂O₁₄) single crystals have langasite type structures and they are famous for their piezoelectric characteristics even in high temperature more than 1,000 degrees [1]. Recently, we studied optical properties such as photoluminescence and radioluminescence that converts high energy radiation to thousands of visible photons by a large scale of quantum cutting of other langasite crystals including CNGS (Ca₃NbGa₃Si₂O₁₄), LGS (La₃Ga₅SiO₁₄), LNGA (La₃Nb₀.₅Ga₅.₃Al₀.₂O₁₄), and LTGA [2,3]. In previous studies, we found that these langasite exhibited quite interesting feature of very fast sub-ns decay time in visible wavelength [2, 3]. Therefore in the present study, we focused to investigate other langasite type material, SNGS, in a comparison with LTGA that was the brightest one among langasite materials above mentioned.

Figure 1 demonstrates X-ray excited radioluminescence spectra of LTGA and SNGS. The emission peaks of LTGA and SNGS appeared at 600 and 400 nm, respectively. SNGS exhibited quite high radioluminescence intensity than LTGA. In the conference, basic optical (transmittance, photoluminescence:PL, PL quantum yield, and PL decay), scintillation (light yield and decay), and thermally stimulated luminescence (TSL) properties will be presented.