Optical, dosimetric, and scintillation properties of MgB$_2$

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MgB$_2$ had attracted much attention because of its high temperature superconductivity [1,2] so that various studies were conducted as a superconducting material. In this study, we studied luminescence properties and radiation responses of MgB$_2$ as a scintillation and dosimetric material. The interesting feature of MgB$_2$ is a chemical composition consisting of light elements, and is quite suitable for dosimeter application which requires biological tissue-equivalent against X and $\gamma$-ray exposure. Furthermore, $^{10}$B has a high cross section with the thermal neutrons. Therefore MgB$_2$ is potentially applicable for both high energy photon and neutron detectors. To apply radiation detectors, basic luminescence properties and radiation responses should be investigated.

Figure 1 shows X-ray excited radioluminescence spectra of MgB$_2$. The emission peak appeared at 450 nm. Figure 2 exhibits thermally stimulated luminescence (TSL) glow curves of MgB$_2$ after X-ray exposure. Glow peaks were observed in at 250 and 350 $^\circ$C and we confirmed that MgB$_2$ really acted as a dosimeter. In the conference, basic luminescence, scintillation and dosimetric properties will be presented.