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Preliminary Study on Neutron image using new crystal scintillator

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Neutron detection is a very difficult work because it directly does not generate secondary charge particles. So far, (n, n) elastic scattering or (n, x) nuclear reaction leading to emission of charged particle is the most common detection methods. In recent year there is an increasing interest in neutron imaging method. In the low-energy range there are several materials that can be classified as the capability for determining neutron energy spectrum and for discriminate against gamma-ray.
Currently, we are interested in the newly grown crystal like these Cs2LiGdCl6(Ce) and Cs2LiCeCl6 crystals. This one's emission band is from 385 nm to 405 nm, that one's is in between 360 nm and 460 nm. The decay time of this one's is about 557 nsec and that one's is 573 nsec for gamma-ray. These decay times is longer than of the common used neutron scintillator as like BC501A, stilbene crystal. They include the Li component and this nuclide can reacts with neutrons according to 1n + 6Li $\longrightarrow$ 3H + 4He, and Ge nuclide is also candidate for neutron detection material.
In this study, we measured the optical characteristic of these materials in order to study the capability of the pulse shape discrimination for detecting neutron against gamma-ray. The absorption band of the silicon based photo-detectors are usually is from 350 nsec wavelength and has the peak at about 450 nsec. This wavelength is proper condition to couple with the new neutron detection material. We test the capability of the new neutron image system that was consists of the new crystal and silicon based photo-diode.
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Primary author: Dr KIM, Hyunduk (Department of Nuclear and Quantum Engineering, Korea Advanced Istitute of Science and Technology)

Co-authors: Prof. CHO, Gyuseong (Department of Nuclear and Quantum Engineering, Korea Advanced Istitute of Science and Technology); Prof. KIM, Hongjoo (School of Physics and Energy Sciences, Kyungpook National University); Prof. GUL, Rooh (Department of Physics, Abdul Wali Khan University, Pakistan)

Presenter: Dr KIM, Hyunduk (Department of Nuclear and Quantum Engineering, Korea Advanced Istitute of Science and Technology)

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