

## The Study of Inorganic Scintillators Properties for Phoswich Detector

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### Abstract

CsI(Tl), CdWO<sub>4</sub>(CWO), Bi<sub>4</sub>Ge<sub>3</sub>O<sub>12</sub>(BGO) and Gd<sub>2</sub>SiO<sub>5</sub>:Ce(GSO) scintillators were studied to manufacture the phoswich detector. The maximum wavelengths of CsI(Tl), CWO, BGO and GSO scintillators are 550 nm, 475 nm, 490 nm and 440 nm for the radioluminescence, the absolute light outputs of CsI(Tl), CWO, BGO and GSO scintillators are 93420 phonon/MeV, 17762 phonon/MeV, 8322 phonon/MeV and 8932 phonon/MeV with neutral filter, the decay time of CsI(Tl), CWO, BGO and GSO scintillators is 1.3  $\mu$ s, 8.17  $\mu$ s, 213 ns and 37 ns by single photon method. The phoswich detector which was manufactured with plastic and CsI(Tl) scintillators could separate the  $\beta$  particle and  $\gamma$  ray. The phoswich detector could also measure the pulse height spectra of the  $\beta$  particle and  $\gamma$  ray by PSD method.

Key word : phoswich, inorganic scintillator, PSD(pulse shape discriminator), decay time, absolute light output