Real time measurements for Tritium and the other beta rays with solid scintillators

Hirofumi Yamamoto(1), Yuichiro Saito(2) and Kazuo Taniguchi(1)

(1) Techno Bridge co., ltd. (2-18-1 Honjyo-Nishi, Kita-Ku, Osaka 531-0073, Japan)
(2) Sanwa Corporation (78 Higashi Oyama, Otama Village, Fukushima 969-1301, Japan)

The Government of Japan issued the ALPS-treated water discharges into the sea. To satisfy international standards, total amount control, and domestic regulation standards for tritium discharge into the sea, it is desired to establish a technology for total and continuous measurement of tritium. The liquid scintillator method, which is a conventional measurement method, cannot measure the total amount and continuously, so it is not possible to shut off the discharge in an emergency. In this development, the use of a solid scintillator, the GAGG scintillator, enabled total and continuous measurement. In addition, we succeeded in measuring tritium in a short period of time and succeeded in developing a continuous total amount of tritium measurement device that enables emergency response when ALPS-treated water is discharged into the sea.

Figure 1 shows typical coincidence spectrum of tritium. The tritium signal was separated from the noise signal by changing the threshold, and it became possible to identify the tritium concentration. Figure 2 shows calibration curve. Coincidence times of 80ns, 200ns and 400ns all showed very good linearity. The longer the coincidence time, the greater the coincidence signal, and as a result, the counting rate tends to increase.

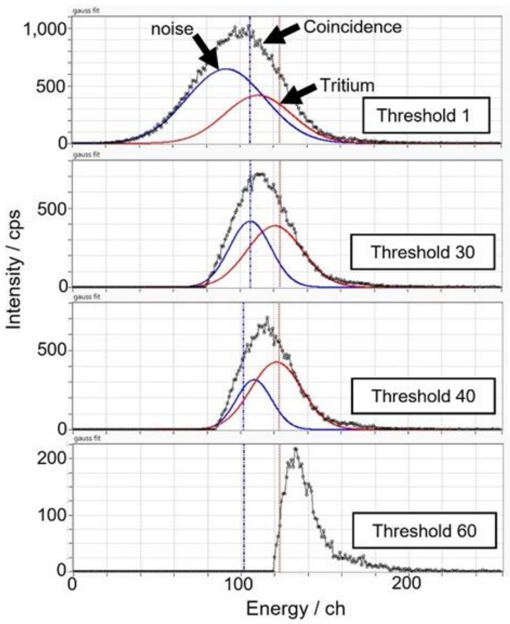

Figure 1. Coincidence spectrum of Tritium.

Separated into noise and Tritium signal by Gauss Fit

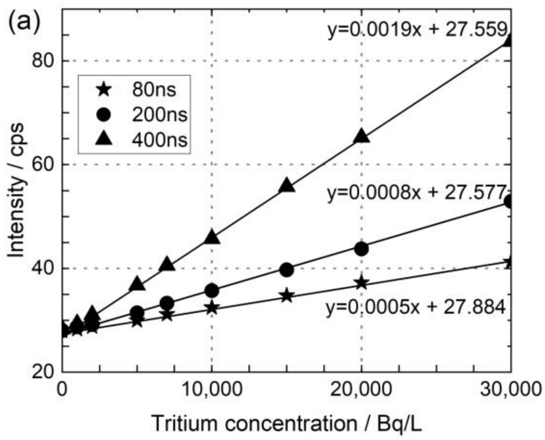

Figure 2 Calibration curve

In the presentation, in addition to the detection limit and measurement time, simultaneous measurement of multiple beta rays will be discussed.