



Contribution ID: 73

Type: **Oral presentation (preferred)**

Benchmarking study on induced activity of H-3 and Be-7 in water target at PAL-XFEL

Thursday, 30 May 2024 11:30 (20 minutes)

Water is considered as one of the candidates of beam dump material for high energy and high-power electron beam. A benchmarking study on a water target is conducted at Hard X-ray (HX) main beam dump bunker of PAL-XFEL to investigate the induced radioactivity concentration in the water target.

An irradiation experiment of the water target was conducted and the induced radioactivity concentrations of H-3 and Be-7 were measured. The electron beam energy during irradiation was 9.5 GeV. The average beam charge was 180 pC with a 60 Hz repetition rate (the average beam power: 10.9 W). The total irradiation time was 138.5 h. The water was contained in a cylindrical stainless-steel chamber and directly irradiated in front of the main beam dump of PAL-XFEL. The size of the chamber was defined as a diameter of 26 cm with a length of 40 cm, considering the accessibility of PAL-XFEL beam dump space and handling of water chamber. After the irradiation, the water in the chamber was sampled and the radioactivity concentration of H-3 was measured by a Liquid Scintillation Counter and that of Be-7 was measured by an HPGe detector.

The water chamber and all the components in PAL-XFEL HX main beam dump bunker was simulated in the FLUKA 4-4.0 code to calculate water activation, taking all the reactions and scatterings in the bunker into account. The induced radioactivity in the water target was calculated considering the beam irradiation condition and compared with measured results.

The discrepancy between the simulated and measured results of H-3 and Be-7 was less than a factor of two. The detailed comparisons between simulated and measured induced radioactivity concentrations will be discussed.

Scientific Topic 1

Scientific Topic 2

Scientific Topic 3

Scientific Topic 4

Scientific Topic 5

Induced radioactivity and decommissioning

Scientific Topic 6

Scientific Topic 7

Scientific Topic 8

Primary author: LEE, Ukjae

Co-authors: LEE, Hee-Seock (Pohang Accelerator Laboratory (PAL)); BAKHTIARI, Mahdi (Pohang Accelerator Laboratory (PAL)); JUNG, Nam-Suk (Pohang Accelerator Laboratory (PAL)); NAKAO, Noriaki (Shimizu Corporation); SANAMI, Toshiya (KEK)

Presenter: LEE, Ukjae

Session Classification: Session 5 - Induced Radioactivity

Track Classification: Induced radioactivity and decommissioning