

Present status of superheavy element production target for gas-filled recoil separators GARIS and GARIS-II

Daiya Kaji and Kouji Morimoto

Nishina Center for Accelerator-Based Science, RIKEN, Wako, Saitama 351-0198, Japan

e-mail: daiya@riken.jp

Keywords: *Production target, superheavy element, target monitoring*

Target for superheavy element (SHE) production was recently upgraded from conventional system of a gas-filled recoil ion separators GARIS [1,2].

One of the developments is a double-layered target system to withstand high-intensity beams as shown in Fig. 1. The key idea is that by dividing a conventional single-layered target foil into two layers, the energy loss in one target is reduced by half. Thus, its temperature rise also reduces by half. The total surface area of the target becomes double. Consequently, gas cooling by the helium gas filled in the recoil separator becomes effective. Therefore, the acceptable beam intensity incident on the double-layered target is expected to be twice that of the single-target case. Nevertheless, the angular spread of the beam on the target is almost same for both cases because the target thickness does not change. Performance of the double-layered target was investigated by measuring the yield of ^{254}No produced via the well-known reaction of $^{208}\text{Pb}(^{48}\text{Ca},2n)$ at a focal plane of the GARIS.

The other development is an identification of every target mounted on a rotating wheel. Several pieces of sector-shaped targets mounted on a rotating wheel have been employed for SHE production experiments with high-intensity beams. Thus far, it had not been possible to determine the thickness difference between each target without which, we adopted the average thickness of all the pieces [1,2]. To distinguish it, we have developed a new wheel frame with an extra ID-tag placed between the spoke-position-indicator tags on the circumference of the wheel as shown in Fig. 2. This is useful in identifying the condition of every target foil. The ID-tag was also applicable to perform multiple experiments with different targets at the same time.

In this conference, we will report the recent target development including target-monitoring system and its application.

References

- [1] D. Kaji et al., Nucl. Instr. and Meth. A590, 198 (2007).
- [2] A. Yoshida et al., Nucl. Instr. and Meth. A521, 65 (2004).

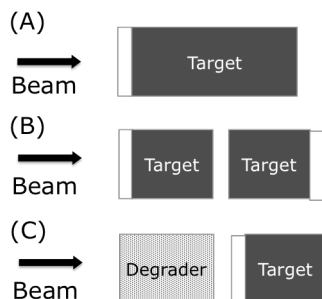


Fig.1: A conventional single-layered target with backing foil (A) was separated into two layers of target (B). Energy degrader mode (C).

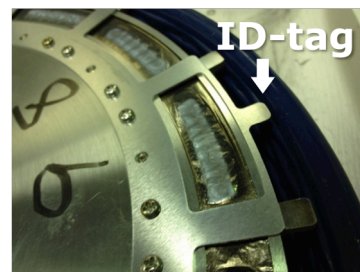


Fig.2: Photograph of the ID-tag frame.