

Operation report of the industrial cooperation team

A. Yoshida,^{*1} T. Kambara,^{*1} H. Takeichi,^{*1} H. Haba,^{*1} S. Shibata,^{*1} K. Takahashi,^{*1} S. Yanou,^{*2} and Y. Wakitani^{*2}

In 2014, the industrial cooperation team was engaged in collaboration research for industrial application of RI beam, fee-based utilization of heavy-ion beams to industry, and fee-based distribution of radioisotopes. These activities are summarized below.

Under a collaborative research agreement entitled “Development and application of wear diagnosis method with RI beams” between RIKEN, University of Tokyo, and two private companies, we develop a method for wear diagnostics of industrial materials using RI beams as tracers. Compared with conventional methods where tracer RIs are produced in the materials by ion-beam irradiations, our method employs RI-beam implantation for the materials, which results in less radiation damage in the materials. We had two beamtimes, IC13-01-01 in February and IC13-01-02 in March 2014, at E7A beamline of the AVF cyclotron. Beams of RI nuclei ^7Be ($T_{1/2} = 53$ days) with intensities up to 10^8 ions/s and ^{22}Na ($T_{1/2} = 2.6$ years) with intensities up to 10^7 ions/s were provided by CNS RI beam separator (CRIB) and implanted near the surface of metallic machine parts, whose wear-loss was evaluated through radioactivity measurements. Another article in this report describes technical details on the preparation and characterization of the RI beams.¹⁾ Concerning this research, two patents have been applied for.²⁾

RIKEN Nishina Center opened the AVF cyclotron, RILAC, and RIKEN Ring Cyclotron (RRC) for industrial utilizations.³⁾ The first proposal of fee-based utilization was submitted by private companies in June and was reviewed and approved by the Industrial Program Advisory Committee (InPAC) in August (proposal number IC14-01). The beamtime was performed in October with a 70-MeV/A ^{84}Kr beam at the E5A beamline of the RIKEN Ring Cyclotron. Another article in this report describes technical details of the beam preparation and characterization according to the customers’ requests.⁴⁾

Since 2007, RIKEN distributes radioisotopes (RIs) produced at RIBF to users in Japan for a fee in collaboration with the Japan Radioisotope Association⁵⁾ (JRIA). According to a material transfer agreement (MTA) drawn between JRIA and RIKEN, JRIA mediates the transaction of the RIs and distributes them to users. The distributed RIs are ^{65}Zn ($T_{1/2} = 244$ days), ^{109}Cd ($T_{1/2} = 463$ days), and ^{88}Y ($T_{1/2} = 107$ days). The RIs are produced by the RI Applications Team at the AVF cyclotron. ^{65}Zn ,

^{109}Cd , and ^{88}Y are produced with a 24-MeV deuteron beam through $^{65}\text{Cu}(d,2n)^{65}\text{Zn}$, $^{109}\text{Ag}(d,2n)^{109}\text{Cd}$, and $^{nat}\text{Sr}(d,xn)^{88}\text{Y}$ reactions, respectively.

In 2014, we delivered three shipments of ^{109}Cd with a total activity of 22 MBq, seven shipments of ^{65}Zn with a total activity of 44 MBq, and one shipment of ^{88}Y with an activity of 1 MBq. The final recipients of the RIs were five universities, one research institute, and two hospitals. Figure 1 shows the yearly trends in the number of orders and the amounts of the distributed RIs.

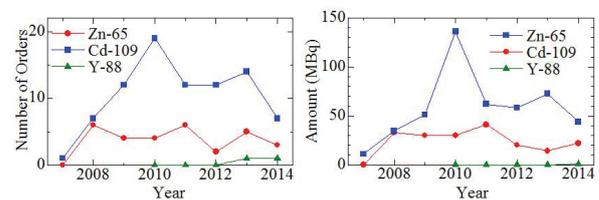


Fig. 1. Number of orders (left) and amount (right) of the RIs distributed yearly from 2007 to 2014. The distribution of ^{88}Y started in 2010.

Information on the RIs can be obtained from JRIA through their dedicated website (<https://www.jram.net/jram/DispatchTopPage.do>; in Japanese) or FAX (03-5395-8055).

References

- 1) A. Yoshida et al.: in this report.
- 2) A. Yoshida et al.: Japanese Patent No. 2014-4555 and T. Kambara, A. Yoshida and H. Takeichi: Japanese Patent No. 2014-34417.
- 3) <http://ribf.riken.jp/sisetu-kyoyo/> (Japanese).
- 4) T. Kambara et al.: in this report.
- 5) <http://www.jrias.or.jp/> (Japanese), <http://www.jrias.or.jp/e/> (English).

*1 RIKEN Nishina Center

*2 Japan Radioisotope Association