Fee-based activities of the Industrial Application Research Team

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The fee-based activities of the Industrial Application Research Team in 2020, which are the utilization of heavy-ion beams in the industry and the distribution of radioisotopes, are summarized below.

RIKEN Nishina Center allows the use of the AVF cyclotron, RILAC, and RIKEN Ring Cyclotron (RRC) by private companies in Japan for a fee.1) At present, the main users are semiconductor companies that irradiate space-use semiconductor devices with Ar, Kr, and Xe ions from the RRC to simulate single-event effects due to the heavy-ion components of cosmic radiation. Proposals for beam utilization are reviewed by a program advisory committee dedicated to industrial use (InPAC). In July 2020, InPAC reviewed and approved via e-mail three proposals that were in continuation to previously approved proposals and held its 10th meeting online, where it reviewed and approved two new proposals. In 2020, six companies executed eleven fee-based beamtimes, seven of which utilized a Kr beam with a total beam time of 153 h and four utilized an Ar beam with a total beam time of 73 h. In response to the users' demand, we are preparing to supply C ions and considering the supply of Xe ions with higher energies.

Since 2007, RIKEN has distributed radioisotopes (RIs) to users in Japan for a fee in collaboration with the Japan Radioisotope Association2) (JRIA). The nuclides are 65Zn (T1/2 = 244 days), 109Cd (T1/2 = 463 days), 88Y (T1/2 = 107 days), 85Sr (T1/2 = 65 days), and 67Cu (T1/2 = 61.8 hours) produced at the AVF cyclotron by the Nuclear Chemistry Research Team. According to a material transfer agreement (MTA) drawn between JRIA and RIKEN, JRIA mediates the transaction of the RIs and distributes them to users. 65Zn and 109Cd are delivered approximately two weeks after the acceptance of an order. 85Sr, 88Y, and 67Cu, which have short half-lives, are not stocked like 65Zn and 109Cd but are instead produced in a scheduled beamtime after an order is accepted. Therefore, they are delivered two months or more after an order. Details can be found in the online ordering system J-RAM3) of JRIA.

In 2020, we delivered one shipment of 109Cd with an activity of 10 MBq, three of 65Zn with a total activity of 12 MBq, two of 88Y with a total activity of 2 MBq, and two of 85Sr with a total activity of 3 MBq. The final recipients of the RIs were four universities, one private company, and one medical research center.

Figure 1 shows the yearly trends in the number of orders and the amounts of distributed RIs. Compared with 2019, the amounts of distributed 109Cd, 65Zn, and 85Sr increased, that of distributed 67Cu decreased, and that of distributed 88Y remained the same. During the past 10 years, the demand for long-lived RIs has drastically decreased, whereas that for short-lived RIs is increasing.

Fig. 1. Number of orders (upper) and amounts (lower) of the RIs distributed yearly from 2007 to 2020. The distribution of 88Y started in 2010, that of 85Sr in 2015, and that of 67Cu in 2018.

References
2) http://www.jrias.or.jp/ (Japanese).
3) http://www.jrias.or.jp/e/ (English).

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