Contribution ID: **41** Type: **Oral Presentation**

Production and Applications of Radioisotopes at RIKEN RI Beam Factory - Search for New Elements through Diagnosis and Therapy of Cancer -

At RIKEN RI Beam Factory (RIBF), we have been developing production technologies of radioisotopes (RIs) and conducting RI application studies in the fields of physics, chemistry, biology, engineering, medicine, pharmaceutical and environmental sciences [1]. With light- to heavy-ion beams from the AVF cyclotron, we produce more than 100 RIs from 7Be (atomic number Z = 4) to 262Db (Z = 105). Recently, we often produce 211At in the 209Bi(α,2n)211At reaction for nuclear medicine [2]. RIs of a large number of elements (multitracer) are simultaneously produced from metallic targets such as natAg, 197Au, and 232Th irradiated with a 135-MeV nucl.–1 14N beam from RIKEN Ring Cyclotron [3]. The multitracer is useful to trace the behavior of many elements simultaneously under an identical experimental condition. We installed a gas-jet transport system to the GAs-filled Recoil Ion Separator (GARIS) as a novel technique for superheavy element chemistry [4]. Long-lived isotopes of 261Rfa,b, 262Db, 265Sga,b (Z = 106), and 266Bh (Z = 107) useful for chemistry studies were produced in the heavy-ion induced reactions on a 248Cm target and their decay properties were investigated in detail using a rotating wheel apparatus for α and spontaneous fission spectrometry [5–8]. Thanks to the pre-separation of Sg atoms with GARIS, chemical synthesis and gas-chromatographic analysis of the first organometallic compound of SHEs, Sg(CO)6 were conducted under a large international collaboration lead by the Univ. Mainz and GSI groups [9].

[1] H. Haba et al., in Handbook of Nuclear Chemistry (2nd ed.), edited by A. Vértes, S. Nagy, Z. Klencsár, R. G. Lovas, and F. Roesch, Vol. 3, Springer, (2010) 1761–1792.
[2] K. Fujiki et al., Chem. Sci. 10 (2019) 1936.
[3] H. Haba et al., Radiochim. Acta 93 (2005) 539.
[4] H. Haba et al., Chem. Lett. 38 (2009) 426.
[5] H. Haba et al., Phys. Rev. C 83 (2011) 034602.
[6] H. Haba et al., Phys. Rev. C 85 (2012) 024611.
[7] H. Haba et al., Phys. Rev. C 89 (2014) 024618.
[8] H. Haba et al., Phys. Rev. C 102 (2020) 024625.
[9] J. Even et al., Science 345 (2014) 1491.

Primary author: HABA, Hiromitsu (Nishina Center for Accelerator-Based Science, RIKEN)

Presenter: HABA, Hiromitsu (Nishina Center for Accelerator-Based Science, RIKEN)

Session Classification: NuclearMedicine