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ORAL PRESENTATION - RIKEN GARIS as a promising interface for superheavy element chemistry –Production of 261Rf, 262Db, and 265Sg for chemical studies using the GARIS gas-jet system–

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Chemical characterization of superheavy elements (SHEs, atomic numbers Z ≥ 104) is an extremely interesting and challenging subject in modern nuclear and radiochemistry. We have been developing a gas-jet transport system coupled to the RIKEN gas-filled recoil ion separator GARIS as a novel technique for SHE chemistry. This system is a promising approach for exploring new frontiers in SHE chemistry: (i) the background radioactivities of unwanted reaction products are strongly suppressed, (ii) the intense beam is absent in the gas-jet chamber and hence high gas-jet transport efficiency is achieved, and (iii) the beam-free condition also allows for investigations of new chemical systems. In this work, we investigated the performance of the system using 261Rf (Z = 104), 262Db (Z = 105), and 265Sg (Z = 106) produced in the 248Cm(18O,5n)261Rf, 248Cm(19F,5n)262Db, and 248Cm(22Ne,5n)265Sg reactions, respectively. The evaporation residues of interest were first separated in flight from the beam and the majority of the nuclear transfer products by GARIS and were guided to the gas-jet chamber at the focal plane of GARIS. The evaporation residues were thermalized in helium gas in the gas-jet chamber, were attached to KCl aerosol particles, and were transported through a Teflon capillary to a chemistry laboratory. Alpha and spontaneous fission decays of 261Rfa,b, 262Db, and 265Sga,b were then investigated with the rotating wheel apparatus MANON under extremely low background conditions. In the conference, productions and decay properties of those nuclides will be discussed in detail. A chemistry program using the GARIS gas-jet system will be also presented.

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