New SHE Z=119 search and related experiments at RIKEN*

H. Sakai and P. Brionnet
RIKEN Nishina Center, Wako, Japan

Aiming to synthesize the superheavy element Z=119, RIKEN Nishina Center(RNC) underwent the SHE Project (2016-2019), which included the construction of the superconducting linac (SRILAC, $E_{\mathrm{max}} = 6.5$ MeV/u) to enable the hot fusion reaction ^{51}V+^{248}Cm possible. The project also allowed us to build a superconducting electron-cyclotron-resonance ion source (SC-ECRIS) to obtain high-intensity ^{51}V beam and a gas-filled recoil ion separator (GARIS-III) suited for the hot fusion reaction. As an introduction, the SHE Project will be briefly mentioned [1].

The optimal bombarding energy (E_{opt}) of ^{51}V for synthesizing an element 119 was, first of all, determined. The quasielastic barrier distribution measurement deduced an average Coulomb barrier height (B_0) [2] as 225.6(2). The side-collision effect (ΔE_{side}) due to a deformation of ^{248}Cm was then estimated by the coupled-channel calculation using the CCFUL code. The final adopted E_{opt} value was 234.8 MeV considering $E_{\mathrm{opt}} = B_0 + \Delta E_{\mathrm{side}} + \Delta E_{\mathrm{opt}}$.

The ^{51}V+^{159}Tb system expected to have a large fusion cross section was also studied to explore the side-collision effect by measuring not only the quasielastic barrier distribution but also excitation functions of evaporation residues for the xn, pxn, and αxn channels [3]. Note, ^{159}Tb is similarly deformed as ^{248}Cm.

The search for the new element Z=119 by ^{51}V+^{248}Cm reaction with GARIS-III has been carried out since 2020 under the nSHE collaboration.

In this presentation, the SHE Project, E_{opt} determination using the quasielastic fusion barrier distribution measurement, study of the side-collision effect by 51V+^{159}Tb reaction, and the present status of the Z=119 search with ^{51}V+^{248}Cm reaction will be discussed.

[1] H. Sakai, H. Haba, K. Morimoto, and N. Sakamoto, EPJ A **58** (2022) 238.
[2] M. Tanaka et al., JPSJ **91** (2022) 084201.
[3] P. Brionnet et al., in preparation.

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