Isomeric RIB Production of Aluminum-26

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$^{26}\text{Al}$ is known as the first specific radioactivity detected via characteristic $\beta$-delayed $\gamma$-ray by astronomical telescopes [1]. Despite a lot of effort over the past three decades, the particular production sites of galactic $^{26}\text{Al}$ are not well understood and there is a discrepancy between observations and theories on estimated abundance of $^{26}\text{Al}$ in the interstellar medium [2]. Its isomer, $^{26m}\text{Al}$, which is $J^\pi = 0^+$ and has a short lifetime of 6.35 s compared with the ground state, $^{26g}\text{Al}$, which is $J^\pi = 3^+$ and $T_{1/2} = 0.72$ Myr, may play an important role to the problem because it falls to $^{26}\text{Mg}$ as super allowed Fermi transition and does not emit any $\gamma$-rays. The two states, $^{26g,m}\text{Al}$, are suggested to be in transition and in thermal equilibrium by thermal photons via low-lying $1^+$ state, at least in extremely high temperature environments, such as a supernova [3]. However the experimental information on the isomer is poorly examined and thus was requested for further experimental study by stellar modelers. The RI beam production of $^{26m}\text{Al}$ is a step to approach the puzzles of the abundance under the equilibrium. We will present an overview of the experiment to produce the isomeric RI beam of $^{26}\text{Al}$ and measure proton elastic resonant scattering with a thick target in inverse kinematics by using the Center for Nuclear Study low-energy radioactive ion beam separator (CRIB [4]), located at RIKEN Nishina Center.

References


