HALF-LIFE MEASUREMENT OF ISOMERIC STATES IN *A* =25 AND 26

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The rapid proton capture process (*rp*-process) passing through proton-rich nuclei plays an important role in the nucleosynthesis. However, a possible path of the rp-process ^{24}Al(p,γ)^{25}Si(p,γ)^{26}P(p,γ)^{27}S has not been well studied yet due to lack of experimental data for their nuclear structure. Since the temperature in the hydrogen burning is around 10^9 K (= ~100 keV), low-lying excited states can affect the *rp*-process taking into account the Maxwell-Boltzmann distribution. In the proton drip-line nucleus ^{26}P, we have recently observed an isomeric state at E_x = 164 keV. Then, the first excited state at E_x = 40(5) keV in ^{25}Si, which is also a candidate for the isomer, has not been researched yet in detail. In order to measure the half-life of the first excited state in ^{25}Si and ^{26}P, the γ-ray spectroscopy have been performed at NIRS-HIMAC.

A secondary beam including ^{25}Si and ^{26}P was produced by the projectile fragmentation of a 300-MeV/u primary beam of ^{28}Si on a 20-mm-thick CH_2 target. The secondary beam was separated and identified by using SB2 beamline and was implanted in an active stopper consisting of three plastic scintillators. The γ rays were measured with three kinds of detectors surrounding the stopper, four $LaBr_3$(Ce) detectors, a HPGe detector, and a NaI(Tl) detector. The delayed γ rays of 44.2(1) keV have been observed in ^{25}Si by these detectors. By fitting theγgated decay curve, the half-life has been determined to be 43(1) ns for the first time. In addition, the half-life of isomeric state in ^{26}P has been also determined to be $T_{1/2}$ = 104(3) ns.

The transition probability deduced from the γ-ray energy and the half-life suggests M1(E2) multipolarity with Weisskopf estimation for ^{25}Si(^{26}P). We will present the spin assignment, the estimation of the (p, γ) reaction rate, and the Coulomb energy difference by comparing with the Shell model and the mirror nucleus.