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# Production cross section measurement of alpha induced reaction on natYb to produce medical RI 177Lu

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Theranostics, which combines therapy and diagnosis, is one of hot topics in nuclear medicine. Theranostic RI to provide such new medical treatment have been investigated. We focus on $^{177}$Lu ($T_{1/2}$ = 6.6 d), which is one of candidates of theranostic RI since it emits both beta particles and gamma-rays, which are suitable for therapy and diagnosis, respectively. However, the production route of $^{177}$Lu is not established yet based on nuclear reaction data. It is important to measure and evaluate nuclear reaction data of $^{177}$Lu. In some existing production routes, we performed an experiment on the alpha induced reaction on $^{nat}$Yb. There is one data set for this reaction up to 40 MeV earlier, but a peak position is not clear. Therefore, we performed an experiment up to 50 MeV to evaluate and verify earlier data.
Our experiment was performed at the AVF cyclotron of the RIKEN RI Beam Factory. The metallic foils of $^{nat}$Yb (purity: 99%) and $^{nat}$Ti (purity: 99.6%) were stacked as a target. The target foils were cut into 8x8 mm2 foils from three $^{nat}$Yb foils and one $^{nat}$Ti foil. Their average thicknesses were found to be 16.43, 16.15, 16.93 and 2.40 mg/cm$^2$ by measuring their surface and weight. The stacked target was irradiated by a 50 MeV alpha particle beam with an intensity of 207 particle nA for 2 hours. After 3 days cooling time to decay out $^{177}$Yb, the parent of $^{177}$Lu, each target foil was measured by gamma-ray spectrometry with a HPGe detector. A decay gamma-ray (208.keV (10.36%)) from $^{177}$Lu was used to derive its cross sections.
Our result is different from both previous data and TENDL-2015 data.
To observe the peak position of this reaction, we need higher incident energy.

**Primary authors:** Ms SAITO, Moemi (Graduate School of Biomedical Science and Engineering, Hokkaido Univ.); Prof. AIKAWA, Masayuki (Graduate School of Biomedical Science and Engineering, Hokkaido Univ.); Mr MURATA, Tomohiro (School of Science, Hokkaido Univ.); Dr UKON, Naoyuki (Advanced Clinical Research Center, Fukushima Medical Univ.); Dr KOMORI , Yukiko (Nishina Center for Accelerator-Based Science, RIKEN); Dr HABA, Hiromitsu (Nishina Center for Accelerator-Based Science, RIKEN); Dr TAKACS, Sandor ( Institute for Nuclear Research, Hungarian Academy of Sciences (ATOMKI))

**Presenter:** Ms SAITO, Moemi (Graduate School of Biomedical Science and Engineering, Hokkaido Univ.)

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