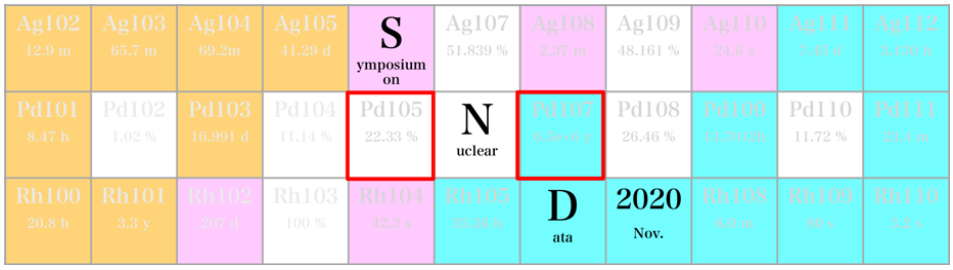

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Measurements of production cross sections of medical radioisotopes via charged-particle induced reactions / 荷電粒子入射反応による医療用 RI 生成断面積測定実験

Radioisotopes can be used for a variety of applications, e.g., radiotherapy and diagnostics in nuclear medicine. There are basically several reactions to produce each radioisotope. Investigations of such reactions are necessary to find better reactions with less byproducts and with higher cost effectiveness. Production cross sections of the radioisotopes are thus important nuclear data. However, there still exist a lack of data and data with large errors. It is necessary to obtain more accurate and reliable data for the application. Recent technical development of accelerators and detectors enables us to reach such data.

We focus on charged-particle-induced reactions among the possible reactions for the production. The charged-particle-induced reactions have an advantage to be able to produce radioisotopes with atomic numbers different from those of targets. We can expect to chemically separate the reaction products from the targets and to obtain the radioisotopes with high specific activity.

Experiments to measure the production cross sections are performed at RIKEN, Japan and ATOMKI, Hungary. The well-developed methods, stacked foil activation technique and high-resolution gamma-ray spectrometry, are adopted. The targets consisted of thin foils were irradiated with the charged-particles beams. Gamma-rays emitted from the irradiated foils without chemical separation were measured by HPGe detectors. Nuclear data required for deduction of cross sections were obtained from online databases. The cross sections of the monitor reactions were compared with the IAEA recommended values to assess the beam parameters and target thicknesses.

The production cross sections can be derived and compared with previous studies and theoretical model calculation in the TENDL-2019 library. Thick target yields of the products for practical use can also be derived from the measured cross sections. The results are expected to contribute nuclear medicine.

We report our research activity on the experiments for the production cross sections of several medical radioisotopes.

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