

Prediction of a KIST PIXE/PIGE Facility Based on Design and Simulations

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Particle induced x-ray emission (PIXE) and Particle-induced gamma emission (PIGE), are powerful yet non-destructive elemental analysis techniques now used routinely by geologists, archaeologists, art conservators and others to help answer questions of provenience, dating and authenticity. The Korea Institute of Science and Technology (KIST) has a Tandem Ion Accelerator, which has been installed in 2011, consisting of mainly four ion accelerators as 6-MV, 2-MV, 0.5-MV, and 400-keV. This study has carried out the design and simulations of a PIXE/PIGE system at the reserved location of the 2-MV output port where is available for standard analysis based on the CAD program and Monte Carlo simulation packages (MCNP6, PHITS, and TRIM). The components of systems as a target vacuum chamber dimension, beam's collimator and beam's nozzle and Si(Li) and HPGe detectors were considered in the design. The design of the PIXE/PIGE will be turned to appropriate with the requirements of the purpose based on the simulated results before installation at the KIST Tandem Ion Accelerator (Republic of KOREA).

Keywords: PIXE, PIGE, Simulation, Accelerator.