

## The LA-ICP-MS radioisotope measurement of pressed powder pellet for geochronology

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The radioisotopes from the bulk sediments are very important to monitor environmental change and/or to date their sedimentation/formation ages.  $^{238}\text{U}$  and  $^{232}\text{Th}$ , which are one of the most important radioisotopes for the dating, have been measured by several apparatuses and methods. Laser ablation-inductively coupled plasma-mass spectrometry (LA-ICP-MS) is an extremely powerful analytical technique which needs little sample preparations, and is applied to measure the concentration of radioisotope of bulk sample. In this study, to apply LA-ICP-MS to wide range of sediment (or powder) with easier measurement protocol, choice of external standard is examined between the standard reference glasses which are commercially-supplied and the pressed powder pellet made of the standard powder rock without binder.

Samples are reference glass SRM 610 and SRM 612 from National Institute of Standard and Technology (NIST), reference powder sample JA-1, JA-2, JB-1 and JB-2 from Advanced Industrial Science and Technology (AIST), and one sediment sample from bottom of Lake Baikal (Ito et al., in press). Powder samples are pressed at 300 kN for 60 seconds to form pellet. These samples are sequentially measured as the external standard or the unknown samples.

In the case of  $^{238}\text{U}$ , regardless the choices of external standards, the concentrations of pressed pellets were estimated with high accuracy. On the other hand, in the case of  $^{232}\text{Th}$ , only when the pressed pellets are used as the external standards, the estimated concentrations of pressed pellets were equivalent to the reference values. Therefore, the matrix effect caused by the difference of physical characteristics between the glass and pellet influences the concentrations of  $^{232}\text{Th}$ , but doesn't influence those of  $^{238}\text{U}$ . Additionally, if the power samples are ground in an agate mortar, the precisions are better than those without grinding. It means that the precisions of pressed pellets measurement are good when the grain sizes are small (~10 micron meters) and homogeneous. Therefore, to obtain high accuracy and precision in the bulk measurement of powder samples, it is suggested that the pressed pellets must be made after grinding, and a pressed pellet of standard reference sample must be used as the external standard.

Ito K., Hasebe N., Sumita R., Arai S., Yamamoto M., Kashiwaya K. and Ganzawa Y., in press. LA-ICP-MS analysis of pressed powder pellets to luminescence geochronology. *Chemical Geology*.