

## Isotope Ratio Measurements using Double Daly Collectors equipped on MC-ICPMS Instruments

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The MC-ICPMS instruments, equipped with a multiple ion counting system setup, can improve the precision of the age determination. With the conventional ion counting system, the gains of the ion detectors (electron multipliers) must be calibrated regularly through the elemental analysis for standard materials. This results in elongation of the analysis time for the age determinations. To improve the long-term stability, and also to improve the accuracy of the age data, we have developed new ion counting system using a two independent Daly collectors equipped on MC-ICPMS technique.

With the Daly ion collectors, both the medium to long-term stability could be remarkably improved from 0.1%/hrs to 0.04%/hrs. Moreover, the counting loss due to dead time of the ion counting system can be corrected based on the conventional non-extendable law, and the beam sizes of greater than 10 MHz (cps) can be successfully measured by the Daly collector. With the multi-ion counting technique, the analysis time for U-Th-Pb age determinations can be significantly reduced down to 1 - 10 sec/spot, and the shorter analysis time enabling to obtain an age distribution of the zircons collected from a sample (age cytometry).

Shorter ablation time results in shallower ablation pit size for the analysis. With the present MC-ICPMS system setup, precise U-Th-Pb ages can be derived from the depth of shallower than 1  $\mu\text{m}$ . Since the U-Th-Pb ages obtained from the rim of zircon crystals can reflect low-temperature geological events, various chronological information, such as timing of crystallization, overgrowth or eruption, can be derived from single zircon crystal using the present technique [1]. In this presentation, analytical capability of the multi-ion counting technique using Daly collector for the age determination will be demonstrated.

**References** : [1] Schmitt A. K. (2011) *Annu. Rev. Earth Planet. Sci.*, 39, 321-349.