

## Development of multiple ion counting- ICP-mass spectrometry for U-Pb Age cytometry on meteorite samples

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Age distribution (age cytometry) is one of the most principal and versatile information to understand the geological events through the Earth's evolutionary history. To take full advantage of the age cytometry, both the high analytical throughput and the better precision in the age determination is severely desired. Combination of laser ablation sampling technique and the high-sensitivity ICP-mass spectrometer (LA-ICPMS) enables us to measure precise U-Pb ages directly from the small area in the solid samples. Recently, we have developed an MC-ICPMS system equipped with multiple-ion counting using three Daly detectors (Obayashi et al., 2017). With the multiple-ion counting system, the analysis time for the U-Pb age determination could be dramatically shortened down to 1 - 5 sec, which was almost 1/4 - 1/10 levels over the conventional U-Pb age determinations using the single collector ICPMS instruments. This suggests that both the higher analytical throughput and the better precision in the Pb/U ratio measurements could be achieved. Moreover, with the Daly detectors, higher long-term gain stability can be obtained, obviating the risk of systematical error in the measured U-Pb isotope ratios. After the correction for the counting loss due to dead time, the Daly detector is capable to accept the signal intensities as high as  $10^7$  cps. This indicates that the overlap of the analysis range, between the Daly detector ( $10^0 - 10^7$  cps) and the Faraday detector ( $10^4 - 10^{10}$  cps), would be at least two orders of magnitude, suggestive of easier cross calibration of the collector gain between the detectors. With the multiple ion counting using three Daly detectors, better precision and smaller contribution of the time-dependent changes in the gain and background counts could be achieved. We will discuss the wide versatility of the present technique for the geochronology on the solar system evolution.

Keywords: Age Cytometry, Multiple Ion Counting, Laser Ablation, U-Pb Dating, Daly Detector