Imaging cytometry for geochemical samples using laser ablation-ICP-mass spectrometry

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Cytometry is the quantitative analysis of cells and cell systems. Cytometry measures optical properties of cells, and most often uses fluorescence to measure specific antigen molecules, intracellular ions and DNA/RNA using antibodies, indicator dyes, or nucleic acid-specific probes. Advantage of the cytometry are the analysis speed, detection sensitivity, the ability to measure many parameters simultaneously, and the ability to sort individual cells, and therefore, mechanism or process of elemental metabolism could be precisely evaluated based on the extensive number of cells (e.g., Bendall et al., 2011; Bodenmiller et al., 2012). This approach can also be applied to understand the solar system evolution based on the numerous number of age data. In recent ten years, we have demonstrated the unique study approach using the distribution pattern of sample ages based on the series of precise age data collected from large number of samples (i.e., age-cytometry) [e.g., Rino et al., 2004; Iizuka et al., 2006; Iizuka et al., 2009; Iizuka et al., 2010]. With the high-time resolution age data obtained by present analytical technique using the LA-ICPMS, further precise and quantitative discussion could be made on the solar system evolution through the age-cytometry. Moreover, the LA-ICPMS technique has further advantages of imaging analysis for samples with various sizes, ranging from <10 microns to >10 mm. Because of high capability for quantitative imaging of ultratrace-elements, together with high analytical capability to measure large-sized samples, the newly developed high-resolution and high-throughput age determination system using a LA-MC-ICPMS has a potential to become a significant tool to promote the age-cytometry. In this presentation, we will demonstrate new analytical technique using LA-MC-ICPMS for the high-resolution and high-throughput age determinations from various geochemical samples.

[1] Bendall *et al* (2011) *Science* **332**, 687-696. [2] Bodenmiller *et al* (2012) *Nature Biotech.* **30**, 858-867. [3] Rino *et al* (2004) *Phys. Earth Planet. Inter.* **146**, 369-394. [4] Iizuka *et al* (2006) *Geology* **34**, 245-248. [5] Iizuka *et al* (2009) *Chem. Geol.* **259**, 230-239. [6] Iizuka *et al* (2010) *Geochim. Cosmochim. Acta* **291**, 189-200.