

Rapid determination of whole-rock major, minor and trace element concentration for silicate, carbonate and phosphate rocks by ICP-SFMS

*Akira Ishikawa¹, Norikatsu Akizawa², Hikaru Sawada¹, Sena Kono¹

1. Department of Earth Science and Astronomy, The University of Tokyo, 2. Atmosphere and Ocean Research Institute, The University of Tokyo

A simple analytical method for the determination of whole-rock major, minor and trace element composition by sector magnetic field type inductively coupled plasma-mass spectrometer (ICP-SFMS) using fused-glass bead (sample + lithium tetraborate) has been developed. This method is particularly useful for rapid but quantitative evaluation of sedimentary sections comprised of variable mixture of silicate, carbonate and phosphate minerals. The fused-glass beads were prepared after LOI (loss on ignition) evaluation, and were properly dissolved into a diluted nitric acid with internal standard elements (In and Bi). The analytical procedure using ICP-SFMS at low, middle and high resolution mode was optimized and evaluated through analyses of sedimentary (JDo-1, JLs-1, JcP-1, NIST694, and JCh-1) and granitic reference materials (JG-1a, JG-2 and JG-3). The results demonstrate that the whole-rock major (Si, Ti, Al, Fe, Mn, Mg, Ca, Na, K and P), minor (Sc, V, Cr, Co, Ni, Cu, Zn and Ga) and trace element compositions (Rb, Sr, Y, Zr, Nb, Cs, Ba, REE, Hf, Ta, Pb, Th and U) of wide-variety of sedimentary rocks were reasonably quantified with the analyses of ICP-SFMS using a standard solution prepared from basaltic reference materials such as JB-3.

Keywords: major element analysis, trace element analysis, ICP-SFMS