

Simultaneous determination of U-Pb age and REE on zircon by LA-ICP-MS

Tsuyoshi Iizuka[1], Takafumi Hirata[2], Shigenori Maruyama[3]

[1] Dept.of Earth and Planetary Sci.,Tokyo.Inst.of.Tech, [2] Earth and Planetary Sci., TITech, [3] Earth and Planetary Sci., Tokyo Institute of Technology

We have developed a procedure for precise in situ elemental and isotopic ratio measurements by laser ablation Inductively coupled plasma quadrupole mass spectrometry (LA-ICP-MS), which can be applied to simultaneous determination of U-Pb ages and REE contents on the same spot in the single zircons. ArF Excimer laser which produces pit sizes less than 20micrometers was used to ablate the zircon samples. Analysis time per one spot is 20seconds.

Simultaneous analysis of U-Pb and REE on zircon is very important because many zircon grains are not homogeneous. However it was difficult because it required prolonged measurements which show a serious U-Pb fractionation effect between U and Pb, and which show decrease of the signal intensity with time. This ablation fractionation dramatically increases the U/Pb isotopic ratio because of the greater volatility of Pb. The effect of fractionation is minimized and the duration of the signal intensity increased by flushing the ablation cell with He instead of Ar (Eggins et al., 1998a), which increases sample transport efficiency and reduces deposition at ablation site. Furthermore, the sensitivity increased about three times (U and Pb) by installing a new lens system (chicane lens system) in ICP-MS.

The LA-ICP-MS U-Pb ages and REE data are coherent and agree with data measured by other techniques. Typical precision of the measurements for $^{207}\text{Pb}/^{206}\text{Pb}$ isotopic and Pb/U elemental ratios determined on single zircon grains is less than 2percent and 3percent, respectively. The data presented here demonstrate that LA-ICP-MS has a potential to become a significant tool for use in zircon geochronology and geochemistry.