The measurement of Ti isotope fractionation in geological standard materials using MC-ICPMS

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We presented the high-precision Ti isotopic compositions on a serious of geological standard materials using MC-ICPMS. Here a new method of Ti separation was developed. First, the sample was mixed by lithium metaborate as ratio of 1:8, then mixture sample was melt by alkali fusion method at 1200℃ in a high frequency furnace, where the samples can be completely melt, including some refractory minerals, such as zircon. Then, two-stage procedure using AG50-X12 and AG1-X8 resin was used to purify Ti from other matrix elements. Using AG50-X12 resin, Ti can be separated from the most major elements, such as Al, Fe, Mn, K and Ca, as well as Cr and HFSE (Nb, Ta, Zr, Hf and Mo,W) using 1 M HNO_3 as leaching solution, the merit of this step is not only to easily get rid of other HFSE without using H_2O_2, which generally was used to specially separate Ti from Zr and Hf et al elements in TODGA or U-TEVA resin, but also to remove most major elements ,especially Al and Ca, which easily to be formed fluoride while HF was added to digest Ti when AG1-X8 resin was used as procedure of Ti separation. After the procedure of AG50-X12 resin, the collected solution of Ti cutting just contain Ti and minor Na, Mg and most V. Using AG1-X8 resin, these elements can be easily separated with Ti. The total Ti procedual blank is less than 2ng. Our Ti isotope compositions, defined as $\delta^{49}Ti$ relative to SRM3162a Ti standard solution, are carried on MC-ICPMS using standard-sample-standard bracketing method. Based on the Ti isotope data of geological standard materials, we can observe that the mantle basalt samples share the uniform Ti isotope compositions, whereas granite samples show higher Ti isotope compositions than these in basalt. Sediments have variable Ti isotope compositions, ranging between data of basalt and granite samples. Our data of Ti isotope composition in serious of geological standard materials indicate Ti isotope can be significantly fractionated in different geological process, so Ti isotope can be used as a good tracer of provenance in geoscience.