

## LA-ICP-MS U-Pb dating using etched zircons

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LA-ICP-MS U-Pb dating is now widely used as a standard procedure. Although this technique is regarded to be inferior to TIMS and SHRIMP for its precision and accuracy, it has a great advantage for its cost-effective, easy-to-apply method. Here, we present another advantage over TIMS and SHRIMP in terms of its robustness against Pb contamination. We used zircons that were chemically etched in alkaline solution (NaOH and KOH) for fission-track dating. Firstly, we used Fish Canyon Tuff and Buluk Member Tuff zircons, both of which are age standards for fission-track dating, to reveal if precise and accurate ages can be obtained using etched zircons. After using Fish Canyon Tuff for correcting U/Pb fractionation, a precise and accurate age of  $16.3 \pm 0.1$  Ma was obtained for Buluk Member Tuff. This demonstrates that the effect of common Pb is minimal even using zircons that were chemically etched, and also Fish Canyon Tuff can be used as a standard for U-Pb dating. Secondly, we dated zircons extracted from granites at Nojima Fault, which is the culprit of the 1995 Kobe earthquake, and its vicinity. It was found that zircons that have not undergone faulting have less Pb contamination than those affected by faulting. The former group showed U-Pb ages of  $\sim 85$  Ma, which seem reasonable for granite intrusion age. On the contrary, zircon U-Pb age from Nojima Fault showed  $\sim 95$  Ma with greater age dispersion, which seems unacceptable. These results demonstrate that chemically-etched zircons can also be datable and hence U-Pb and fission-track ages are easily cross-checked by using the same zircon grains.

## Extreme isotopy of metabolism environment

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Irrespective of range of physical and chemical parameters of metabolism environment of all biodiversity such as parameter points of pressure, temperature, salinity, pH, etc., for each type of organisms it is existed the typical own, phylogenetically predetermined site of this range. Each living organism, having a natural habitat, is physiologically adapted for its characteristic physical and chemical parameters. The extreme deviation from individually natural conditions of metabolism environment for all forms of life leads to failure of functioning of an individual biochemical complex that leads to ontogenetic unfavorable consequences. Isotopy of metabolism environment is integrated connected with all parameters of the environment and has a wide range in all biodiversity of life with prominent features of genotypical and individual phenotypical differences [1]. Parameters of isotopy can also have extreme values. For example the isotopic structure of metabolism environment (in particular for carbon) of methanogenic and methanotrophic organisms can accept extreme value. Does the extreme deviation from natural parameters of metabolism environment is critical for living organisms? Experimental results give the affirmative answer - YES. It have farmed monoisotopic ( $\delta^{13}C = -868,107\%$ ) plant *Arabidopsis thaliana* with modified gene expression. Apparently it's connected with changing in conformation of biopolymers which caused modifying methylation pattern that is influencing their activity and specificity [2].

[1] Galimov (1981) *A Nature of the Isotopes Biological Fractionation*. Nauka Publ. Moscow. [2] Ivanov (2007) Does the conformation of DNA depend on the difference in the isotope composition of its threads? *Russian Journal of Physical Chemistry*. B 2(6), 649–652.

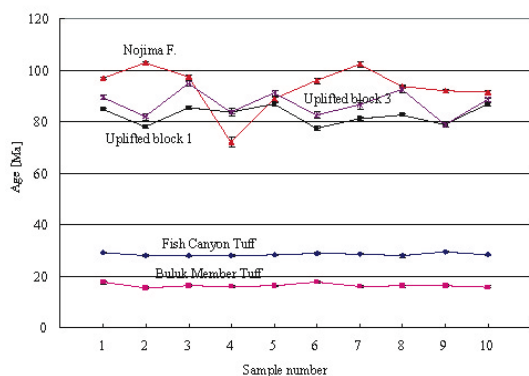


Figure 1: Grain by grain U-Pb ( $^{238}\text{U}$ - $^{206}\text{Pb}$ ) ages.