

Isothermal annealing experiment of fission-tracks in zircon -Comparison of thermal annealing characteristics between samples-

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Fission-track (FT) is damage trail in mineral detector, and its retention in minerals depends only on the time and temperature (Fleischer et al., 1965). Zircon FT annealing is constrained through the laboratory studies and analysis of ultra-deep borehole samples (Tagami et al., 1990; Yamada et al., 1995a,b; Tagami et al., 1998; Hasebe et al., 2003). However, about the change in annealing behavior by difference of its mineralogical characteristics, in zircon unlike in apatite, it isn't well known.

In this study, 9 samples were used. At first, 5 samples which spontaneous FT densities are considerably low were irradiated with neutron to produce induced FT. After so, they were heated under the isothermal condition of 1 hour, and measured FT lengths. Finally, the data was compared with NST zircon (Yamada et al., 1995b). At the same time, it made comparative study of the chemical composition in zircon.

At unannealed, FT lengths of NST and FCT are significantly longer than some samples. Otherwise at 650 degrees, there was no difference in FT lengths between samples. So age and spontaneous FT density (alpha radiation damage and alpha-recoil radiation damage) don't depend on annealing behavior. Thus, radiation damage by alpha emission is unrelated to FT annealing behavior. And at chemical composition, concentrations of major isotopes in samples in this study which are ^{89}Y , ^{178}Hf , ^{232}Th , and ^{238}U were 600-3000ppm, 5000-8000ppm, 60-200ppm, and 100-300ppm, respectively. So annealing behavior doesn't change in this chemical composition range. But at 650 degrees, FT lengths of TRG07 which wasn't irradiated (has only spontaneous FT) is significantly shorter than that which was irradiated (has spontaneous and induced FT). As the reason, (1) annealing behavior actually change (2) there is bias depends on FT density. This should be researched. In the samples that a lot of number (almost 30) was able to measure, the higher temperature is, the larger standard deviation is. This is conformal with previous data.