



Fracture formation process by $^{40}\text{Ar}/^{39}\text{Ar}$ dating at the Hishikari epithermal gold deposit, Japan

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The Quaternary Hishikari high-grade gold epithermal deposit is located in southern Kyushu, Japan. The typical precipitation sequence at the Hishikari deposit is adularia-quartz sequence, and adularia, especially columnar adularia, is often observed beside the hostrock, showing adularia occurred immediately after fracturing. Therefore, the age of adularia is a good indicator of timing of fracturing. We obtained twelve $^{40}\text{Ar}/^{39}\text{Ar}$ ages of adularia from the Hosen-1 vein at -20m level and +62.5m level.

The errors reported as 2 sigma are on the order of 1-3% or less for the plateau ages, and are almost concordant with the isochron ages. In all cases, clear plateaus comprising over 50% of the total extracted gas were obtained. Accordingly, these $^{40}\text{Ar}/^{39}\text{Ar}$ ages of adularia at the Hishikari deposit are reliable enough to discuss the history of fracturing.

A time difference between earlier adularia-quartz sequence and following one shows an interval of fracturing. Since the longest time was between the band U-III and U-IV, the intervals of fracturing range from 30,000 to 140,000 years approximately at the Hosen-1 vein. The band U-III, about 80cm in width, was formed in a very short period by only one vein formation because apparent banding structure was not observed. These results suggest that fracturing occurred intermittently at different temporal intervals rather than continuously at a constant rate. Duration of fracturing is totally about 250,000 years at the Hosen-1 vein and fracturing occurred at least six times in this period.