An investigation of the α-recoil-track dating method

B. WAUSCHKUHN[1]*, R. JONCKHEERE[1] AND L. RATSCHBACHER[1]

[1] Geological Institute, TUBA Freiberg, 09596, Germany (*correspondence: wauschku@geo.tu-freiberg.de)

Recoil-track dating of micas can give ages up to several Ma referring to low closure temperatures and thus to geological processes affecting the upper crust. This would add to the geochronological toolkit and form a useful extension of multi-method dating. The fission-track and recoil-track methods are similar and have a common scientific origin, but the one is used to great advantage in applied geological research while the other has not attained the status of an accepted dating method. The main reasons are the limited research effort invested in its development [1, 2, 3, 4] and the narrow range of experimental methods [5, 6, 7] that have been brought to bear on the key questions.

Our work aims at a focussed investigation of the theoretical and practical aspects of recoil-track dating. We re-investigate track etching, observation and counting in order to establish useful dating procedures (Figure 1). Our experiments use new tools for measuring the etchable track size and the etch rate of the mica surface. Track diameter measurements, mirror-image analyses and etch-anneal-etch experiments address the issue of the etch-time dependence of the recoil-track densities. Track-based methods will also be used for determining the U,Th-concentrations, required for calculating the age of mica samples.

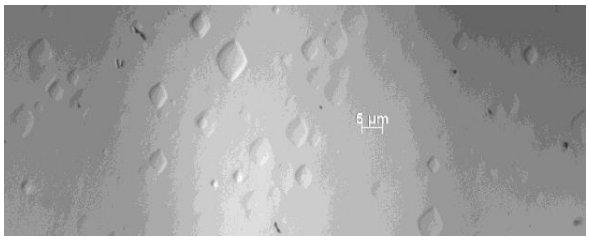

Figure 1: Reflected light image (Nomarski contrast) of α-recoil tracks in muscovite etched for 300 min in 48% hydrofluoric acid.

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