THERMOCHRONOLOGY THROUGH FISSION TRACKS IN ZIRCON: METHODOLOGICAL STUDY

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The zircon can be used as natural detector of ^{238}U fission fragments to determine through Fission Tracks Method the thermochronology of the region where the samples were collected. These fragments leave tracks in the zircon lattice with few angstroms of diameter. The fission track analyses through optical microscopy can be accomplished after a convenient chemical etching of the zircon samples with NaOH:KOH (1:1), to (225 ± 2) ºC, for periods among 4-72 hours (Tagami et al, 1990, Garver, 2003).
It was observed that the etching changed from grain to grain and in some cases in the surface of the same grain. This phenomenon is known as etching anisotropy. And, this could affect the uniformity of revealed fission-track density on the grain surface. With the objective to study this phenomenon, micro-Raman spectroscopy and Scanning Electron Microscopy (SEM) analyses had been carried out. The micro-Raman spectroscopy evaluated the crystalline grains lattice in the areas with and without fission tracks and the SEM technique evaluated the grains chemical composition.
The zircon sample was submitted to micron-Raman spectroscopy without etching and with etching for 6, 12 and 18 hours. We can observe the existence of three different types of zircon grains, here called homogeneous, anomalous and no-homogeneous. The homogeneous grains have a superficial uniform tracks distribution while that the anomalous lose all its crystalline structure after the first six hours etching. The no-homogeneous grains have small areas that preserve its crystalline structure and there is a uniform tracks distribution in these areas. Besides this study, the Scanning Electron Microscopy, SEM, was used to analyze if there are some chemical elements that could explain the etching anisotropy.
Through the methodology that associates the Fission Tracks Method (FTM) and the materials characterization it has been dated zircon samples from Ilha Bella, located in coast line of Southeast of Brazil, São Paulo State.

Keywords: Fission Tracks; Raman Spectroscopy; Scanning Electron Microscopy; Zircon.
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