

Evidence of dmisteinbergite (hexagonal form of $\text{CaAl}_2\text{Si}_2\text{O}_8$) in pseudotachylyte: A tool to constrain the thermal history of a seismic event

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ABSTRACT

The determination of the maximum temperature achieved by friction melt (T_{melt}) in pseudotachylyte-bearing faults is crucial to estimate earthquake source parameters (e.g., earthquake energy budgets, coseismic fault strength) on a geological basis. Here we investigated the mineralogy of a pseudotachylyte from the Gole Larghe Fault (Italian Alps) by using X-ray powder diffraction, micro-Raman spectroscopy, and EDS-equipped field emission scanning electron microscopy. In particular, we report the presence of the hexagonal polymorph of $\text{CaAl}_2\text{Si}_2\text{O}_8$ (dmisteinbergite) in a pseudotachylyte. Published experimental work shows dmisteinbergite can crystallize at 1200–1400 °C by rapid quenching. Therefore, the presence of dmisteinbergite in pseudotachylyte could be a reliable geothermometer for friction melts for which T_{melt} has only as yet been estimated.

Keywords: Pseudotachylyte, earthquake, dmisteinbergite, geothermometer