

Illite crystallization and faulting caused by hydrothermal fluid

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Based on the field survey and microstructural observations of massive chert block, we shall report that there is a strong possibility that illite crystallized from fluids contributed to fault formation.

The fault studied was developed in a massive chert block exposed in Watarai, Mie Prefecture, which belongs to the Southern Chichibu Belt. This massive chert block includes many stylolites and white bands, which develop parallel to the fault plane. The white band is particularly unique, and its width is about 0.5 mm to 1 cm. The massive chert is composed of trace amounts of chlorite along with quartz. On the other hand, the stylolite and white band are composed of quartz as well as trace amounts of chlorite and illite, and large amounts of illite, respectively. The white band also contains numerous voids less than a few μm in diameter, which might have caused due to pressure solution. These facts indicate that the illite was crystallized from a fluid. Furthermore, from the fact that a large amount of illite that was affected by fault slip can be seen on the fault plane, we summarize that the white band became a weak plane and acted finally as a fault plane in the massive chert block. The crystallinity of illite existing on the fault plane is better than those of stylolites and white bands. We propose that this is due to frictional heat caused by fault slip.

Keywords: Chert, Stylolite, Illite, Fluid, Fault