

Biotite chloritization mechanism via polytype analysis

Toshihiro Kogure [1], Jill . F. Banfield [2], Takashi Murakami [3]

[1] Min. Inst. Univ. Tokyo, [2] Department of Geology and Geophysics University of Wisconsin-Madison, [3] Mineralogical Inst., Univ. of Tokyo

Atomic-resolution transmission electron microscopy was used to investigate the chloritization mechanisms of granitic biotite and to reveal polytypic details of resulting chlorite. Comparison of stacking sequences in 2M1 and longer period biotite polytypes with sequences in areas containing chlorite layers reveals that typically, two biotite layers transform to one chlorite layer, losing two potassium interlayer sheets and two tetrahedral sheets. Less commonly, a potassium interlayer sheet is replaced by a brucite-like sheet. Based on the relative frequency of the two chlorite to one biotite vs. one biotite to one chlorite mechanisms, the net result of chloritization is considerable volume decrease along c^* .