American Mineralogist, Volume 95, pages 98–103, 2010

Texture analysis of a turbostratically disordered Ca-montmorillonite

Luca Lutterotti,[1] Marco Voltolini,[2] Hans-Rudolf Wenk,[2,*] Kaushik Bandyopadhyay,[3] and Tiziana Vanorio[3]

[1]Department Materials Engineering and Industrial Technologies, University of Trento, 38123 Trento, Italy
[2]Department Earth and Planetary Science, University of California, Berkeley, California 94720, U.S.A.
[3]Department of Geophysics, Stanford University, Stanford, California 94305, U.S.A.

Abstract

Turbostratic disorder, consisting in a disorder in which different layers have different rotations with respect to an axis, is commonly found in montmorillonite. The effect of this kind of disorder on diffraction profiles is significant and must be taken into account, especially in quantitative phase analysis. The effect of the turbostratic disorder in textured materials has never been investigated. In the present work, we have developed a strategy to perform quantitative texture analysis on turbostratically disordered Ca-montmorillonite aggregates that were uniaxially compressed. Synchrotron diffraction images were analyzed with a Rietveld method and disordered and ordered models are compared. The method proved to be reliable and ready for further applications.

Keywords: Texture analysis, turbostratic disorder, Rietveld method, montmorillonite, synchrotron X-rays