
Thermal Transformation of Antigorite as Studied by Electron-Optical Methods

Helena de Souza Santos and Keiji Yada

Laboratório de Microscopia Eletrônica, Instituto de Física Universidade de São Paulo, São Paulo, Brasil
Research Institute for Scientific Measurements, Tohoku University, Sendai, Japan

Abstract: The thermal transformation of a Brazilian antigorite heated dry from 600° to 1300° C was studied by high resolution electron microscopy and selected area electron diffraction (SAD). Below 600° C, the antigorite particles did not change morphologically or crystallographically, as evidence by the presence of the superlattice in the SAD patterns and lattice images. At 650° C, traces of antigorite remained, although the superlattice structure had disappeared and the first indications of forsterite formation were observed in the same SAD. Diffraction patterns of the transition phases showed various topotactical relationships between antigorite and forsterite. At 800° C, the crystallization to forsterite was much more pronounced. At 900° C, the individual particles retained their original shapes, but they were actually pseudomorphs, for their SAD patterns showed only forsterite. Between 1000° and 1300° C various topotactical relationships were observed. Although the overall transformation to forsterite appears to be similar for both chrysotile and antigorite, the transformation of antigorite took place at a slightly higher temperature (~50° C) with a larger number of topotactical relationships than for chrysotile. Enstatite was formed at 1300° C, but it was impossible to determine the topotactic relations between enstatite and forsterite, which was possible with chrysotile.

Key Words: Antigorite • Asbestos • Chrysotile • Forsterite • Lattice image • Selected area electron diffraction • Serpentine • Topotactic structure

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