STRUCTURAL VARIABILITIES IN SERPENTINE-GROUP MINERALS. AN HRTEM VIEW

DÓDONY, I.
Department of Mineralogy, Eötvös Loránd University; Pázmány Péter sétány 1/C, H-1117 Budapest, Hungary

The magnesian serpentine minerals are trioctahedral phyllosilicates with idealized composition $Mg_3[Si_2O_5(OH)_4]$. The most abundant serpentine minerals are antigorite, chrysotile, and lizardite.

High-resolution transmission electron microscopy (HRTEM) affords a close look at the complex structures and intergrowths of the serpentine minerals. All contain alternating sheets of cations in tetrahedral and octahedral coordination. Lizardite, the flat species, and it is the reference mineral for estimates of the structures of antigorite, chrysotile, 15-sectored, and 30-sectored polygonal serpentines. Here the lizardite structure is used as a reference for the other serpentine minerals. We provide examples of disordered stacking, coherent intergrowths of lizardite and chlorite, HRTEM images of different polygonal serpentines, and antigorites, as well as HRTEM images and simulated diffraction data of chrysotile structures both along and perpendicular to the fibre axis.

References

DÓDONY, I. (1997): Physics and Chemistry of Minerals, 24: 39–49.

DÓDONY, I. & BUSECK, P.R. (2004a): International Geology Review, 46: 507–527.

DÓDONY, I. & BUSECK, P.R. (2004b): American Mineralogist, 89: 1631–1639.

DÓDONY, I., PÓSFAI, M. & BUSECK, P.R. (2002): American Mineralogist, 87, 1443–1457.

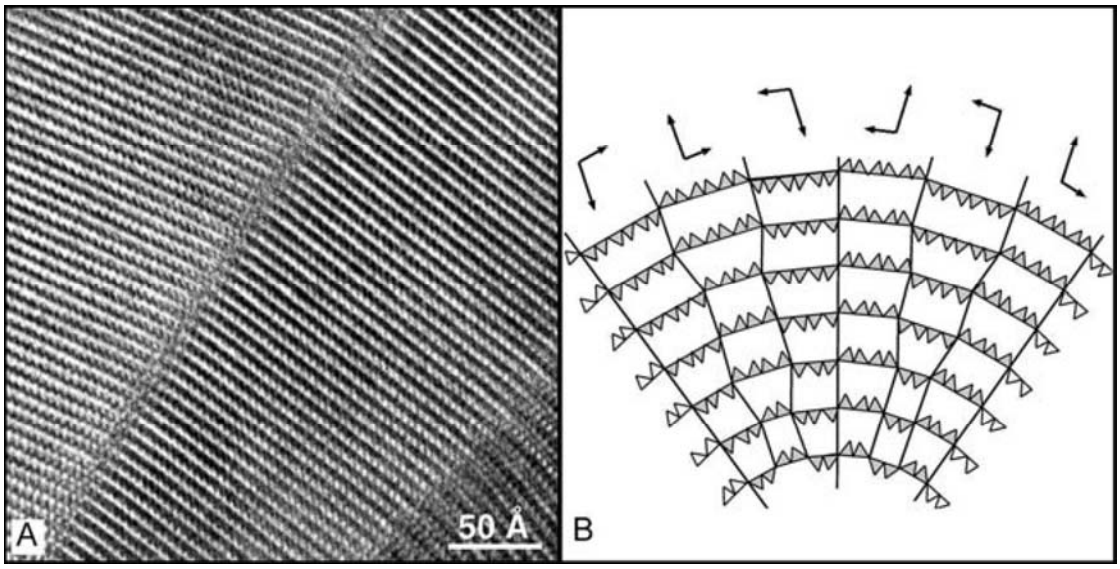

Fig. 1: (A) A part of an experimental HRTEM image on 30-sectored polygonal serpentine (30PS). Discontinuity in (001) lizardite planes at sector boundaries indicates reversals in tetrahedral sheets. (B) A schematic sketch of tetrahedral sheet structure in 30PS. The arrows show **b**/2 and **c** axes for the illustrated sectors.

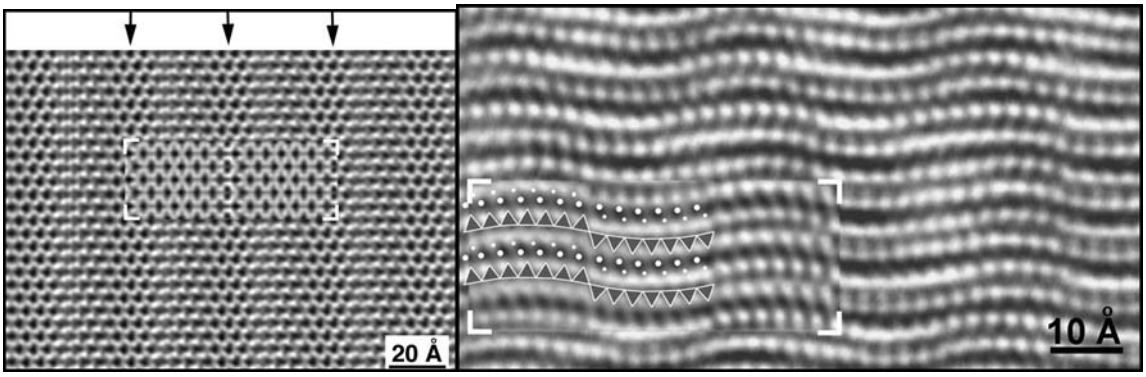

Fig. 2: Experimental [001] HRTEM image of antigorite (m = 14) and the corresponding simulated HRTEM image (inserted). The arrows show the places of inversion in the tetrahedral sheet. The lack of 4- and 8-membered silicate rings is evident.

Fig. 3: Experimental and simulated (inserted) [010] HRTEM images of antigorite (m = 14). A sketch indicates the tetrahedral sheets (triangles) and Mg positions (larger white spots), hydroxyls are small white dots.