

The water content of olivines: Pannon Uniform Lithospheric Infrared spectral Database (PULI)

B. Udvardi (1,2), I. Kovács (2), Z. Pintér (1,2), K. Hidas (1,3), L. Kutassy (2), G. Falus (2), P. Lendvay (2), T. Zelei (2), T. Fancsik (2), T. Gál (4), J. Mihály (5), C. Németh (5), J. Ingrin (6), Q. Xia (7), J. Hermann (8), A. Perucchi (9), L. Vaccari (9), and C. Szabó (1)

(1) Lithosphere Fluid Research Lab, Department of Petrology and Geochemistry, Eötvös University, Budapest, Hungary, (2) Hungarian Geological and Geophysical Institute, Budapest, Hungary, *corresponding author: kovacs.istvan.janos@mfgi.hu, (3) Instituto Andaluz de Ciencias de la Tierra (IACT), Consejo Superior de Investigaciones Científicas (CSIC-UGR), Avenida de las Palmeras 4, Granada, Spain, (4) Hungarian Institute for Forensic Sciences, Budapest, Hungary, (5) Institute for Molecular Pharmacology, Science Research Institute, Hungarian Academy of Sciences, Budapest, Hungary, (6) Unité Matériaux et Transformations (UMET), UMR CNRS, Lille, France, (7) School of Earth and Space Sciences, University of Science and Technology of China (USTC), Hefei, China, (8) Research School of Earth Sciences, The Australian National University, Canberra, Australia, (9) ELETTRA Synchrotron Light Laboratory, Trieste, Italy

Infrared spectroscopy can offer valuable information on hydrogen incorporation into minerals. Recent advance in infrared technology and methods resulted in a considerable increase in our knowledge on volatile species in minerals. Over the last decades several papers and books, dealing with various aspects of water content in nominally anhydrous minerals of the crust and mantle analyzed by FTIR, have been published. To keep up with this rising knowledge on infrared spectroscopy of minerals, an electronic spectral database is needed. This is the reason why we have constructed the Pannon Uniform Lithospheric Infrared (PULI) Spectral Database, which will include large amounts of infrared spectra for NAMs, diamonds and clay minerals.

As one of the initial tasks of the database development, thematic reference spectra were collected in a uniform format for olivines and re-evaluated according to a new quantitative protocol. Fundamentals of our analytical setup (i.e. sample preparation, microscope settings) and evaluation protocol (i.e. background subtraction, integration and calibration factors) are presented and used for the quantitative re-evaluation of upper mantle and experimentally derived olivine spectra. This effort contributes to a better evaluation of water content in the Earth's mantle and to the recognition of the multiple role of water in mantle processes. We analyzed olivine grains of the Pakistan olivine standard by different infrared microscopes in several different countries and laboratories to provide clear and objective instructions regarding analytical settings and spectral evaluation.

To put constraints on the micro-scale (<50 μ m) distribution of OH- component in the standard olivine high-resolution infrared maps were collected using synchrotron light source. Our measurements foreshadow the significance of this kind of mapping due to the possible small-scale heterogeneity within crystals. We encourage you to extensively use this new database and to refer to puli.elgi.hu for any additional information.

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