Ancient fragments in the subcontinental lithospheric mantle beneath the Carpathian-Pannonian Region

LÁSZLÓ ELŐD ARADI[1]*, CSABA SZABÓ[1], JOSE MARIA GONZALEZ-JIMENEZ[2], WILLIAM GRIFFIN[2], SUZANNE Y. O'REILLY[2] AND KEIKO HATTORI[3]

[1]Lithosphere Fluid Research Lab, Eötvös University, Hungary
[2]CCFS/GEMOC, Dept. of Earth and Planetary Sciences, Macquarie University, NSW 2109, Australia
[3]Department of Earth Sciences, University of Ottawa, Canada
*correspondance: aradi.laszloelod@gmail.com, http://lrg.elte.hu

The Carpathian-Pannonian region (CPR) was formed by lithospheric extension accompanied by mantle flow and upwelling in the Neogene. Plio-Pleistocene alkali basalts brought fragments of the lithospheric mantle at five places in the CPR: Styrian Basin (Austria, Slovenia), Little Hungarian Plain, Bakony-Balaton-Highland (Hungary), Nógrád-Gömör (Hungary, Slovakia) and Perşani Mountains (Romania).

Several sulfide-bearing lherzolite xenoliths from the CPR were chosen to determine their PGE-distribution and Re-depletion ages (T_{RD}). Both whole-rock and *in situ* analyses show fractionated PGE patterns, which are controlled by partial melting of the upper mantle indicated by the correlation between Al_2O_3 and IPGE/PPGE. This is also supported by the major- and trace- element contents of the rock-forming minerals. *in situ* PGE analyses on sulfide grains show high and variable abundances of Os, Ir, Ru and Rh, with decreasing abundance from Rh to Au and a strong negative Pt anomaly. The total concentrations of PGEs range between 4 and 796 ppm.

The Re-depletion model ages range from near-zero to 1.6 Ga. Most of the T_{RD} ages are older than the oldest (Paleozoic) crustal rocks of the CPR. The main peaks at 0.6-0.8 Ga could be related to the breakup of Rodinia. The remainder of the model ages scatter between 0.95 and 1.35 Ga, which are probably related to the amalgamation of Rodinia. Outliers as old as 1.6 Ga (from Nógrád-Gömör) suggest that the subcontinental lithospheric mantle beneath the region may contain ancient domains dating from the assembly and break-up of the Columbia supercontinent, but these have been overprinted by numerous metasomatic events.

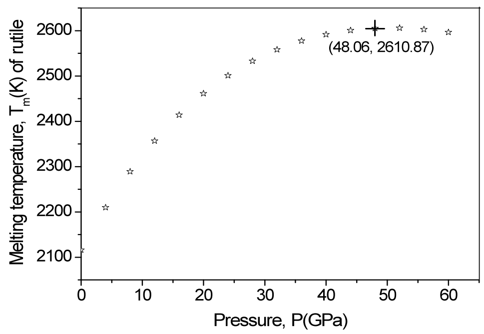
This research was funded by the Hungarian Science Foundation (OTKA, 78425 to Cs. Szabó).

Melting of Rutile under Pressure

S. ARAFIN, R. N. SINGH ,YOUSUF AL-SAIDI AND A.K. GEORGE

Physics Department, College of Science, Sultan Qaboos University, Box:36, Al-Khoudh 123, Oman

Rutile is one of the polymorphs of TiO_2. Out of the total mass of the Earth's crust, amount of rutile found in nature ranges from 0.5% at the upper crust to 0.8% at the bottom crust [1]. It is used in photovoltaic devices, integrated wave guides, gas and humidity sensors, and solar cells. Research on rutile is important to earth scientists because a complete understanding of the composition and thermal state of the Earth's interior depends on information about the elastic properties of this mineral at high pressure and temperature [2].



Information on pressure dependence of the melting temperature of rutile is scanty. Fritz [3] has measured the pressure dependences of the six elastic constants of single-crystalline rutile (TiO_2) by using ultrasonic techniques and a pressure range of 0–2 GPa. We present here pressure dependence of the melting temperature and thermophysical properties such as enthalpy, viscosity and diffusivity of rutile using a semi-empirical approach based on Lindemann's law. The pressure range used in the present study is 0-60GPa. Our preliminary results show that the melting maximum of rutile is 2610 K and it occurs at 48 GPa.

[1] Rudnick, R.L. and Fountain, D.M., 1995, Rev. Geophys., **38**(3), 267-309 [2] Isaak, D.G., Carnes, J.D., Anderson, O.L., Cynn, H. and hake, E., 1998, Phys Chem Minerals, **26**, 31-43. [3] Fritz I.J., 1974, J. Phys. Chem. Solids, **35**, 817-826.

DOI:10.1180/minmag.2013.077.5.1