Fe β-factors for sulfides from NRIXS synchrotron experiments

V.B. POLYAKOV[1]*, E.G.OSADCHII[1], D.A.CHAREEV[1], A.I.CHUMAKOV I.A.SERGEEV[3]

[1]Institute of Experimental Mineralogy, RAS, Chernogolovka, 142432, Russia (*corespondence: polyakov@iem.ac.ru)

[2]European Synchrotron Radiation Facility (ESRF), BP 220, F-38043 Grenoble, France

[3]Forschungszentrum Juelich GmbH.

We obtained equilibrium Fe isotope fractionation factors (β-factors) for troilite pyrrhotites, sphalerite, pyrite, and chalcopyrite nuclear inelastic x-ray resonant scattering (NIXRS) experiments perfomed in ESRF (Fig. 1).

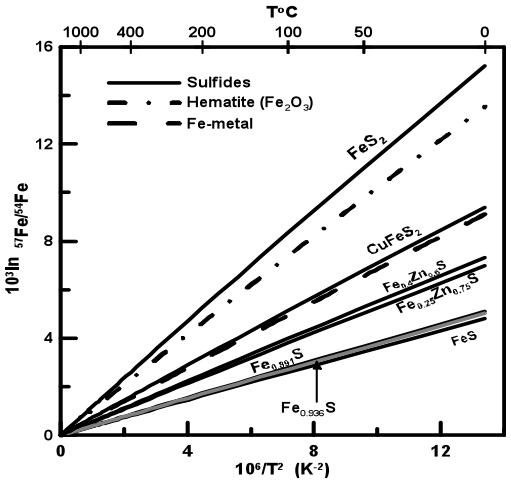

Figure 1: NIRXS-derived β-factors of sulfides.

The β-factor for troilte from our experiment coinsides with that obtained in [1] from NRIXS data [2]. β-factors for pyrrhotites and sphalerite are quantified first time. The Fe β-factor for pyrite agrees excellently with DFT calculations [3] and deviates significantly from the Mössbauer-derived β-factor [4]. The β-factor for chalcopyrite agrees with those calculated in [5] based on data in [6]. Our experiments with chalcopyrite, performed at different temperatures, revealed that anharmonicity may effect on the NRXIS spectrum and lead to overestimating the NIRXS-derived β-factor.

[1] Polyakov *et al* (2007) *GCA* **71,** 3833-3836. [2] Kobayashi *et al* (2004) *Phys. Rev. Lett.* **93,** 195503. [3] Blanchard *et al* (2009) *GCA* **73,** 6565-6578. [4] Polyakov and Mineev (2000) *GCA* **64,** 849-865. [5] Polyakov & Soultanov (2011) *GCA* **75,** 1957-1974. [6] Kobayashi *et al* (2007) Phys, Rev. B **76,** 134108

Thermochronological estimates of uplift and cooling rates of the Bodonchin metamorphic wedge

O.P. POLYANSKY*AND V.P. SUKHORUKOV

V.S.Sobolev Institute of Gology and Mineralogy, SB RAS. Pr. Ac. Koptyug 3, Novosibirsk, 630090, Russia (*correspondence: pol@igm.nsc.ru)

Reconstructing the tectonic history of the structures of the Irtysh-Bulgan lineament (SW Mongolia) is of interest for solving the problem of continental crust formation. Based on the new thermochronological and geothermobarometric data, we analyze the metamorphic conditions and tectonic evolution of the Bodonchin zonal complex in the Mongolian Altay [1]. A crustal fragment exposed on the southern slope of the Mongolian Altay consists of isocline-folded rocks, over 20 km thick, and shows a continuous metamorphic zoning from greenschist facies to migmatites. Using THERMOCALC P-T estimates we calculated the thermal state of the crust beneath Mongolian Altay during terrane collision and reconstructed the paleogeotherm at the peak of syncollisional metamorphism. The thermal state of the crust was characterized by high radiogenic heat production (1.66 μW/m3) and elevated heat flow (45 mW/m2). The estimated P-T conditions in two zones (staurolite-kyanite schists and migmatites) of the Bodonchin complex correspond to the paleogeotherms with average temperature gradients of $\partial T/\partial z$ = 25.5 and 27.2ºC/km. The data from isotope dating of zircon and other metamorphic minerals (Bt, Ms, Amp) were used to construct a thermochronological model for the retrogressive stage of polymetamorphic evolution. The uplift rates of metamorphic rocks as a result of thrusting within the Bulgan Fault zone were estimated at 315–1010 m/Myr.

[1] Polyansky *et al* (2011) *Rus. Geol. Geophys* **52**, 991-1006.

DOI:10.1180/minmag.2013.077.5.16