

## Use and abuse of Sm-Nd whole-rock isochron data for komatiites

A.V. KOVALENKO<sup>1\*</sup>, E.B. SALNIKOVA<sup>1</sup> AND N.A. ARESTOVA<sup>1</sup>

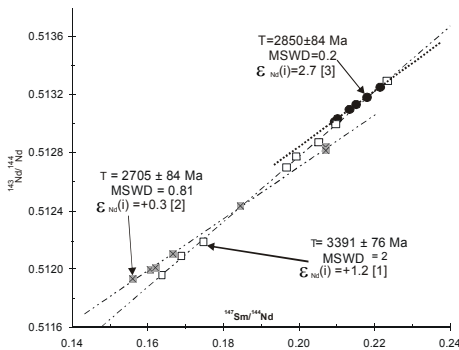
<sup>1</sup>Institute of Precambrian Geology and Geochronology RAS, 199034, Makarova emb., 2, St-Petersburg, Russia (\*correspondence: alexkov@peterstar.ru)

The Volotsk komatiite-basalts suites have been regarded as the oldest volcanic rocks of the Baltic Shield, with Sm-Nd ages of  $3391 \pm 76$  Ma [1]. We proposed that the age of the Volotsk suites is much younger and obtained a new Sm-Nd age of  $2701 \pm 84$  Ma for different samples [2]. This is unexpectedly young, considering the ages of komatiites in the region (2.95 – 2.90 Ga).

A recent Nd study of the Volotsk suites [3] showed that LREE-depleted samples plot around a regression line that yields an age of  $2850 \pm 84$  Ma. An internal regression line, obtained by using Sm-Nd mineral (Pl, Hbl) and whole rock data, corresponds to an age of  $2653 \pm 29$  Ma. Thus, the former 3.4 Ga age has no geological significance, but is rather a mixing line [3].

Thus, there are three Sm-Nd regression lines reported for the komatiites of the Volotsk suite (~ 3.4, 2.85 and ~ 2.7 Ga) (Fig. 1).

We have dated zircons from a gabbro dyke that cuts the Volotsk suite, by the U-Pb method (TIMS). This yielded an U-Pb age of  $2840 \pm 3$  Ma.



**Figure 1:** Sm-Nd diagram for whole-rock samples of Volotsk suites.

Following [3], we argue that the age of the Volotsk suites is 2.85 Ga, and that the 2.7 Ga Sm-Nd regression line demonstrates open-system behaviour in some samples, due to later tectono-thermal events.

- [1] Puchtel *et al.* (1993) *Intern. Geol. Rev.* **35**, 825-839.  
 [2] Kovalenko & Arestova (2007) XVIII isotope geochem. sympos. Moscow, 123-124. [3] Puchtel *et al.* (2007) *Prec. Res.* **158**, 119-137.

## Mineral surface reactions and the role of solvent structure dynamics and ion hydration in solution

MAGDALENA KOWACZ\* AND ANDREW PUTNIS

Institut für Mineralogie, University of Muenster, Germany (\*correspondence: magdakowacz@uni-muenster.de)

We use reactions of barium sulfate in the presence of simple ionic salts as a model system to illustrate how solution composition can affect thermodynamic and kinetic properties of mineral growth and dissolution. We show that rates of reactions, mode of growth and morphological features change under conditions of constant thermodynamic driving force (supersaturation) and constant ionic strength (IS) depending on the salt used to modify the IS. Salt-specific effects on dissolution and precipitation processes show systematic behavior that correlates with the effects of respective electrolytes on water structure dynamics and on lattice ion hydration in solution.

Furthermore our results indicate that morphology modification by additives does not necessarily imply specific additive-surface interactions as the same changes in the shape of nuclei as observed in the presence of different background electrolytes can be obtained just by varying water temperature, which has a similar effect on water structure dynamics as the addition of the respective salt. Nanoscale morphological features such as shape of islands, which are also reflected in the bulk crystal appearance, rather express the solvation properties of the solvent and its affinity with the solute.

We propose a theoretical explanation of the role of solvent properties and solute hydration on crystal behavior. Simple 1:1 electrolytes used to modify the solvation environment can give insight into the principles which can be subsequently extended to more complex systems. We show how understanding the interdependence of ion properties, solution structure and crystal growth/dissolution behavior can help us to explain such phenomena as impurity incorporation and crystal growth in the presence of organic additives.