

## **Dissolution rate contributors in an isochemical system of glass and crystals**

RODICA FILIPESCU<sup>12</sup>, CORNELIUS FISCHER<sup>13</sup>,  
ADRIANA SOCACIU<sup>12</sup> AND ANDREAS LUTTGE<sup>123</sup>

<sup>1</sup>Universität Bremen, Abt. Mineralogie, Marum, Klagenfurter Str., D-28359 Bremen

<sup>2</sup>Babeş-Bolyai University, Department of Geology. Str. Kogălniceanu 1, 400084 Cluj-Napoca

<sup>3</sup>Rice University, Earth Science Dept, 6100 Main Street, Houston, TX 77005, USA

To what extent are surface dissolution rates governed by the crystal structure? Are surface reaction rates constrained by the evolution of a rough crystal surface topography during dissolution? In order to answer these questions we analyse surface dissolution rates of an isochemical albite system. We compare spatially and temporally resolved surface reaction rates of an albite glass and a fully-ordered crystal of isochemical composition (SOCACIU et al., this volume).

Surface evolution of both materials is quantified over a series of time intervals in a long-term flow-through experiment using atomic force microscopy (AFM) and vertical scanning interferometry (VSI). Surface maps of identical sample positions are collected after each reaction period. Material flux maps are then calculated from the topography data. Conversion of material flux maps into the frequency domain results in reaction rate spectra [1] [2]. The analysis of reaction rate spectra over reaction time reveals the dominant rate modes. Furthermore, the rate spectra concept provides insight into the existence of rate contributors that are independent of glass or crystal surface changes. We are now able to deconvolve the rate distribution in order to quantify the impact of surface roughness to the overall rate of dissolving solids.

[1] Fischer et al. (2012), *AJS*, **312**, 885-906 [2] Fischer et al. (2014), *Appl Geoch* **43**, 132-157