

Evaporation of aqueous salt solutions in sandstone during dissolution/crystallization cycles

J. Desarnaud¹, H. Derluyn², L. Molari³, S. de Miranda³, V. Cnudde², N. Shahidzadeh¹

¹Van der Waals-Zeeman Institute, Institute of Physics, University of Amsterdam, Science Park 904, 1098 XH Amsterdam, The Netherlands

²Ghent University, Department of Geology and Soil Science – UGCT Krijgslaan 281 S8, 9000 Gent, Belgium

³DICAM, Alma Matter Studorium, University of Bologna, Zia Zamboni n.33, 40126 Bologna, Italy

j.e.desarnaud@uva.nl

We have investigated the dynamics of sodium chloride recrystallization and its effect on the drying kinetics of sandstones saturated with NaCl solutions at different relative humidities.

On the microscopic-scale, we studied the kinetics of nucleation and growth in the porous material during dissolution/deliquescence followed by drying using high resolution X-ray computed tomography, Scanning Electron Microscopy and microscale experiments on salt nucleation and growth in confined geometries as models for a single pore in the stone.

Depending on the relative humidity, the dynamics of growth, the crystallisation pattern and its localization may be very different in different cycles (Fig. 1)[1]. The results of the microscale experiments give insight into why at the macroscale the kinetics of evaporation of sandstone samples varies with the number of evaporation/wetting cycles and with the size of the sample.

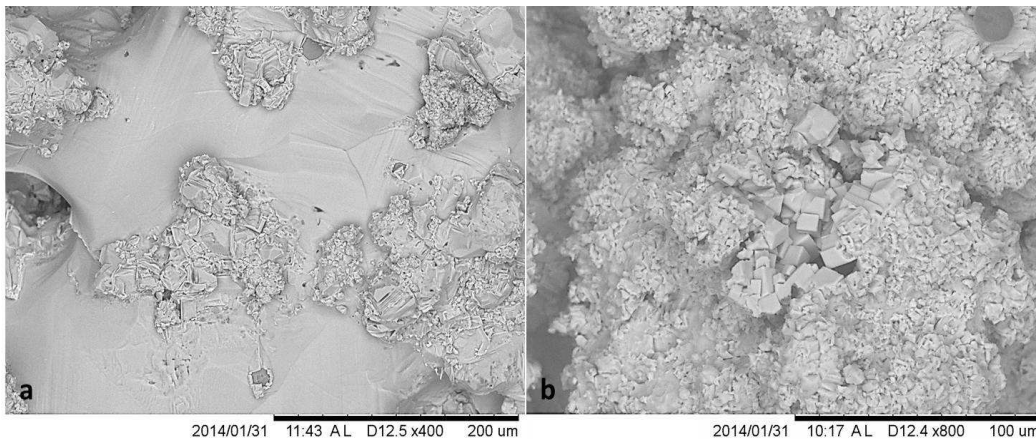


FIG. 1. Crystallization patterns on the top face of sandstone. (a) After 1 cycle, and (b) 3 cycles. (Relative Humidity = 20%, T = 20°C).

[1] Shahidzadeh, N.; Desarnaud, J. Damage in Porous Media: Role of the Kinetics of Salt (re)Crystallization. *Eur. Phys. J. Appl. Phys.* **2012**, *60*, 24205 1-7