Contribution ID: **432** Type: **Oral Presentation**

Impact of salt on sorption isotherms of water in nanoporous media

Tuesday, 31 May 2022 17:00 (15 minutes)

Salt water is ubiquitous in nature (e.g. geomaterials, soil, clouds formation) and in technology (e.g. desalination, concrete weathering, heritage conservation). In most of these situations, salt water is confined within a porous medium, often with pores down to the nanometer scale: for example, crystallization and dissolution cycles induced by humidity changes are known to induce structural damage to building materials, artwork, etc [1]. And yet, these processes are not well characterized, especially when pores are in the nanometer range [2]. Here, we investigate the response of the salt water confined in several porous silicon and alumina samples (average pore diameter from 3 nm to 20 nm) to humidity cycles. We performed sorption isotherms where we monitored optically water content in the porous medium. We systematically characterized how the salt concentration impacts the shape of the isotherms and compared these results to a minimal model coupling solution thermodynamics to capillarity, nucleation and confinement effects [3]. We also probed the appearance of the crystal and its structure by X-ray diffraction.

Acceptance of the Terms & Conditions

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MDPI Energies Student Poster Award

Yes, I would like to submit this presentation into the student poster award.

Country

France

References

[1] Robert J. Flatt et al. "Chemo-mechanics of salt damage in stone". en. In: Nature Communications 5.1 (Sept. 2014). Bandiera abtest: a Cg type: Nature Research Journals Number: 1 Primary atype: Research Publisher: Nature Publishing Group Subject term: Chemical physics;Geophysics Subject term id: chemical-physics;geophysics, p. 4823. issn: 2041-1723. doi: 10.1038/ncomms5823.

[2] Michael Steiger. "Crystal growth in porous materials—I: The crystallization pressure of large crystals". en. In: Journal of Crystal Growth 282.3-4 (Sept. 2005), pp. 455–469. issn: 00220248. doi: 10.1016/j.jcrysgro.2005.05.007

[3] Olivier Vincent et al. "How Solutes Modify the Thermodynamics and Dynamics of Filling and Emptying in Extreme Ink-Bottle Pores". In: Langmuir 35.8 (Feb. 2019). Publisher: American Chemical Society, pp. 2934–2947. issn: 0743-7463. doi: 10.1021/acs.langmuir.8b03494.

Time Block Preference

Time Block A (09:00-12:00 CET)

Participation

Online

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Session Classification: MS13

Track Classification: (MS13) Fluids in Nanoporous Media