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Dynamical and thermodynamic aspects of evaporation of solutions from nanoporous media

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Water condensation and evaporation from saline porous materials has attracted the attention of scientists for years due to a large field of applications: salt weathering of buildings, desalination of water, CO2 sequestration, soil decontamination, etc···[1, 2, 3]. A complete understanding of related nanoscale processes is however lacking, in particular concerning the coupling between evaporation/condensation and crystallization/deliquescence in confinement [4]. While the comprehension of the phenomenon has progressed in the past few years [4, 5, 6], there are still some challenges remaining in characterizing and understanding these processes.

Here we carried out thermodynamic experiments coupling sorption isotherms of nanoporous media containing salt, to dynamical measurement of the evaporation of salt solution droplets from the surface of the same nanoporous media. We show that we can account for both thermodynamic and dynamical experiments by using a minimal model involving coupled phase change of the solvent (water evaporation) and the solute (salt crystallization).

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Participation

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References

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