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Imbibition-Induced Deformation Dynamics in Nanoporous Media JUAN SANCHEZ, ZHUOQUING LI, Institute of Materials Physics, Hamburg University of Technology, MICHAEL FROEBA, Institute of Anorganic and Applied Chemistry, Hamburg University, PATRICK HUBER, Institute of Materials Physics, Hamburg University of Technology — We present time-dependent macroscopic dilatometry experiments on the deformation of nanoporous monoliths (carbon and silica) upon spontaneous, capillarity-driven invasion of water. We find two distinct dynamical regimes. One of them can be quantitatively traced to deformations originating in changes in the surfaces stress at the inner pore walls (dynamic Bangham's regime) upon water invasion, whereas the second one results from Laplace pressure effects [1][2][3]. Our study demonstrates that it is possible to dynamically monitor imbibition dynamics by simple dilatometry measurements.

[1]*Elastic response of mesoporous silicon to capillary pressures in the pores.* Gennady Gor, Luca Bertinetti, Noam Bernstein, Peter Fratzl and Patrick Huber. *Applied Physics Letters* (2015).
[2]*Adsorption-induced deformation of nanoporous materials - A review.* Gennady Gor, Patrick Huber and Noam Bernstein. *Applied Physics Reviews* (2017).
[3]*Elastocapillarity in nanopores: Sorption strain from the actions of surface tension and surface stress.* Gennady Y. Gor, Patrick Huber and Jörg Weißmüller. *Physical Review Materials* (2018).

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