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Drying by bubble nucleation of plant-inspired nanoscale porous media OLIVIER VINCENT, ALEXANDRE SZENICER, JULES GUIOTH, ERIK HUBER, DAVID SESSOMS, ABRAHAM STROOCK, Cornell University — Drying from porous media is a very common phenomenon, with examples of increasing importance such as drying of soils and plants during drought, or drying of rocks subsequent to underground gas flow. Understanding and predicting drying in these examples is particularly challenging due to the large range of lengthscales that coexist in the porous medium, which can span from nanometers to meters. Inspired by the structures of the water conducting tissues that can be found in trees, we built artificial porous structures with two well separated lenghtscales: voids or channels at the micrometer scale that are interconnected by pores only a few nanometers wide. This presentation will explore the dynamics of drying in these model structures and show that drying occurs by bubble nucleation (cavitation) inside the medium rather than by the receding of liquid-vapor interfaces from the edges. We will explore the consequences of that unusual drying mode on the drying front propagation, with different regimes that can be obtained by varying the sizes and shapes of the tailored features in the nanoporous medium.

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