
Contribution ID: **112**

Type: **Oral Presentation**

# A shrinking pore network model for drying porous media

*Wednesday, 1 June 2022 16:15 (15 minutes)*

In the context of pore network modeling of drying porous media, the pore structure of porous media is often assumed to remain stationary during the drying process. Based on this simplification, several studies have been conducted that resolve and also raise many interesting and important algorithmic and application questions. However, questions remain on how the pore structure of drying porous media changes over time and how much the overall rate with which liquid is evaporated from such media can be impacted. This work seeks to provide fundamental insights into this topic by means of a shrinking pore network model. This model accounts for intraparticle mass transfer in a drying porous medium, morphological changes of its pore structure, and the connection to the medium's surroundings. The pore network model is defined on, initially, a regular three-dimensional lattice of spherical pores and cylindrical throats, and it accounts for forces caused by the capillary pressure acting on the solid matrix. Under the capillary pressure, the effective force acting on the invaded throat increases the throat radius while the neighboring throat size decreases. Thus, some throats or pores may close. After each invasion, the liquid is redistributed, and pore/throat sizes are updated accordingly. Compared with stationary pore network models, the drying kinetics predicted by the shrinking pore network model shows a sharp drop in evaporation rate but a relatively longer first drying period. As regards the volume reductions, three periods can be distinguished: The change in the volume of the porous medium is not evident at the beginning and is followed by a linear shrinkage, whereas the volume reduction rate decreases in the second drying period and approaches zero by the end of the drying process.

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## References

## Time Block Preference

Time Block B (14:00-17:00 CET)

## Participation

Unsure

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**Session Classification:** MS04

**Track Classification:** (MS04) Swelling and shrinking porous media