Contribution ID: **528** Type: **Poster + 3 Minute Pitch**

Numerical Model of a thermochemical heat storage reactor

Thursday, 17 May 2018 12:11 (2 minutes)

Thermochemical heat storage has a large potential due to its high storage density. In the range of high to medium temperature heat storage the system Calciumoxide –Calciumhydroxide is of special interest, as it reacts at handable temperatures (300-500 ℃), is environmentally friendly and financially attractive.

The following chemical reaction is considered:

$CaO_s + H_2O_g \rightleftharpoons Ca(OH)_{2,s} + \Delta H_R$

In order to develop a technical application, the processes of the chemical reaction have to be investigated: The granular material ($Ca(OH)_2$ / CaO) undergoes a volume change so that its porosity and permeability and thus the flow processes of the water vapor are changed. Furthermore, the reaction kinetics and the cycling stability have to be examined.

To understand the processes and estimate their relevance on the different scales, a numerical model is built in the open-source simulator DuMuX. The constitutive relations of the complex system are depicted in a multiphase system. Changes in the structural properties such as porosity and permeability are considered. Emphasis is further put on the formulation of the energy balance.

References

Acceptance of Terms and Conditions

Click here to agree

Primary author: Mrs SEITZ, Gabriele (University of Stuttgart)

Co-authors: Prof. CLASS, Holger (University of Stuttgart); Prof. HELMIG , Rainer (University of Stuttgart)

Presenter: Mrs SEITZ, Gabriele (University of Stuttgart)

Session Classification: Parallel 10-B

Track Classification: MS 4.27: Novel Concepts in Energy Storage