

Masters project:

3D pattern formation during precipitation reactions in porous media

Scientific question:

The dynamics of one fluid replacing another one inside a porous medium can be significantly altered if chemical reactions take place at the interface between the two fluids. Examples for such systems are enhanced oil recovery (EOR) or carbon dioxide sequestration. Recent experiments of the displacement of two reacting miscible fluids in a quasi two-dimensional Hele-Shaw cell show that the flow leads to and is influenced by a large variety of precipitation patterns [1]. However, comparable studies on the pattern formation in three-dimensional systems do not exist. This project will investigate the morphology of such precipitation patterns in 3D.



The experiment:

We will pump a miscible fluid inside a pack of glass beads which is already saturated with a second fluid. Upon contact the two fluids will form an insoluble salt. The resulting precipitation pattern will be monitored using x-ray tomography. The analysis of the patterns will be done in close collaboration with the group of Anne De Wit in Brussels.

What will you learn:

Building a fluid dynamics setup and controlling it with Labview. Image analysis using Matlab.

Whom are we looking for:

You have a hand for chemical experiment. You are careful and self-critical in your work. You have some previous experience in programming (it does not matter in which language).

Contact:

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[1] A. De Wit *et al.*, Proc. Nat. Acad. Sci., doi: 10.1073/pnas.1409552111 (2014).