Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Forced imbibition through model porous media CELESTE ODIER, Univ Lyon, Ens de Lyon, Univ Claude Bernard, CNRS, Laboratoire de Physique, F-69342 Lyon, France. Total SA, BERTRAND LEVACHE, Total SA. Laboratoire Physico-Chimie des Interfaces Complexes, Total- ESPCI ParisTech CNRS - UPMC, DENIS BARTOLO, Univ Lyon, Ens de Lyon, Univ Claude Bernard, CNRS, Laboratoire de Physique, F-69342 Lyon, France — A number of industrial and natural process ultimately rely on two-phase flow in heterogeneous media. One of the most prominent example is oil recovery which has driven fundamental and applied research in this field for decades. Imbibition occurs when a wetting fluid displaces an immiscible fluid e.g. in a porous media. Using model microfluidic experiment we control both the geometry and wetting properties of the heterogenous media, and show that the typical front propagation picture fails when imbibition is forced and the displacing fluid is less viscous than the non-wetting fluid. We identify and quantitatively characterize four different flow regimes at the pore scale yielding markedly different imbibition patterns at large scales. In particular we will discuss the transition from a conventional 2D-front propagation scenario to a regime where the meniscus dynamics is an intrinsically 3D process.

Celeste Od
Univ Lyon, Ens de Lyon, Univ Claude Bernard, CNRS, Laboratoire de Physique, F-69342 Lyon, France. Total

Date submitted: 28 Jul 2016 Electronic form version 1.4