Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Control of viscous fingering by chemical reactions CHINAR RANA, ANNE DE WIT, Univ Libre De Brussels — Viscous fingering is a hydrodynamic instability that occurs in porous media when a less viscous fluid displaces a more viscous one. The interface between both fluids then deforms into fingers, which leads to enhanced mixing. We investigate theoretically the possibility to control this instability thanks to chemical reactions changing the viscosity *in situ*. To do so, we analyze numerically the influence of different chemical kinetics on viscous fingering, looking in particular for conditions stabilizing the instability. We show that the reaction-diffusion specificities of the chemical front can be used to tune the viscous fingering pattern. The properties of this reactive fingering are obtained by computing onset times, mixing lengths and characteristics of the nonlinear fingering dynamics as a function of the parameters of the problem which are the relative viscosity ratios of reactants and products, the Damköhler number quantifying the ratio of hydrodynamic and chemical times scales as well as the Péclet number.

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Date submitted: 26 Jul 2016 Electronic form version 1.4