Abstract Submitted
for the DFD13 Meeting of
The American Physical Society

Chemical control of hydrodynamic instabilities in partially miscible two-layer systems A. DE WIT, L.A. RIOLFO, L. LEMAIGRE, Université Libre de Bruxelles, F. ROSSI, University of Salerno, M. RUSTICI, M.A. BUDRONI, Universita di Sassari — Hydrodynamic instabilities at the interface between two partially miscible liquids impact numerous applications including sequestration of supercritical liquid CO_2 in old petroleum reservoirs or saline aquifers. As an alternative to difficult *in situ* studies of the related mixing dynamics, we introduce a new laboratory-scale model system on which buoyancy- and Marangoni-driven convective instabilities of partially miscible two-layer systems can easily be studied and controlled in presence or not of chemical reactions. This system consists in the stratification of a pure ester on top of a denser partially miscible aqueous solution in the gravitational field. The rich convective dynamics observed upon partial dissolution of the ester in the water followed by its hydrolysis highlight the specificity of partially miscible systems as compared to fully miscible or immiscible ones, i.e. the possibility to control the convective pattern and the mixing properties by tuning (i) the intrinsic miscibility of the ester in water, (ii) the feedback of the dissolved species on its own miscibility as well as (iii) the composition and reactivity of the aqueous solution with the ester phase.

Anne De Wit
Université Libre de Bruxelles

Date submitted: 26 Jul 2013 Electronic form version 1.4