Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Statistics of admixture distribution in flows through rigid foams[1] PETR DENISSENKO, PIERRE LE FUR, JOZEF VLASKAMP, MARK WILLIAMS, Warwick University, XIAOLEI FAN, Manchester University, ALEXEI LAPKIN, Cambridge University — Diffusion and dispersion of admixture in flows through rigid foams need to be accounted for when modelling catalytic reactions on the foam surface. We study diffusion of admixture and scaling exponents of admixture concentration both experimentally and by numerical simulations. A liquid admixture was continuously released from a point source at the upstream boundary of a block of rigid SiC foam. Foam thickness was varied from 20 to 80 average pore sizes. A flow with Re of up to 300 based on the pore size was imposed by a progressive cavity pump. The distribution of the tracer at the exit from the foam was measured using LIF and the concentration moments have been calculated. Numerical simulation of the flow in laminar regime has been performed within OpenFoam for the Re from 1 to 100. Geometry of the sample was acquired by Micro Computed Tomography scanning of the actual foam sample. A steady-state SIMPLE method was used to solve the incompressible steady flow in the volume of 20x20x40 average pore sizes. Diffusion and dispersion of passive scalar has been studied by following individual streamlines. Results are interpreted in terms of mixing, heat transfer, and selectivity of catalytic reactions at the foam surface.

[1]This Research is supported by European Commission under the 7th Framework Program

Petr Denissenko
Warwick University

Date submitted: 01 Aug 2014 Electronic form version 1.4