Abstract Submitted
for the DFD09 Meeting of
The American Physical Society

Droplet Dynamics in Two Phase Microflows BRIAN CARROLL, CARLOS HIDROVO, The University of Texas at Austin — An experimental investigation is presented that addresses the engineering challenges of a two-phase, inertial-based micromixer. Results indicate a predictable pattern between the Reynolds number in the microchannel and the detached droplet size and geometric features, with increasing gas velocities leading to a high aspect ratio (elongated) detached slugs. Full droplet detachment and entrainment into the gaseous flow, where the droplet shares no interface with the solid wall, was not observed in the range of parameters tested. The influence of the solid wall during the collision and mixing process remains unresolved, although it is evident that increasing the surface energy of the solid boundary facilitates the coalescence and mixing process. Using Laser Induced Flourescence, the extent of mixing is quantified experimentally and compared for different detached droplet sizes, velocities, and microchannel geometries. This data, together with the conditions required for detachment and entrainment, will provide a more complete picture of an inertial-based, droplet collision micromixer.

Brian Carroll
The University of Texas at Austin

Date submitted: 07 Aug 2009 Electronic form version 1.4