Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Laser Induced Dual Fluorescence Ratiometric Technique for Mixing Characterization in Microfluidic Systems[1] DAVID BEDDING, CARLSO HIDROVO, Northeastern University — Increasing the rate of mixing within microfluidic systems is vitally important in understanding biological and chemical reaction kinetics and mechanisms. The small length scales characteristic of these systems which translate into highly viscous, Stokes flows result in mixing that is primarily dominated by diffusion. In order to counteract this, an approach that utilizes inertial droplet collisions to promote chaotic advection between two mixing species has been developed. A Laser-Induced Dual Fluorescence (LIDF) system in conjunction with a high-speed camera and appropriate optics are used to capture two intensity fields providing information about the mixing process as well as the excitation intensity field over the volume of interest. The rate of mixing for the coalescing droplets was quantified by taking the standard deviation of the first intensity field over time, while the second intensity field provides information about the intensity field. A ratiometric imaging approach allows removal of mixing fluorescence signal noise in the form of variation in excitation intensity, primarily from the lasing patterns and lensing effects within the interrogation volume.

[1]NSF CAREER Award Grant CBET 1151091

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Date submitted: 31 Jul 2016 Electronic form version 1.4