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ELISA and DNA reactions enhancement using micromixing FREDERIC BOTTAUSCI, IGOR MEZIC, UC Santa Barbara, MICRO-NANOSCALE DYNAMICAL SYSTEMS TEAM — We report new experimental results on biological reactions enhancement using two different micromixing processes. The first process consists of perturbing the unmixed fluids by using the kinetic of jet flows emanating from a series of transverse channels. The jet flows are pressure driven (the pressure does not exceed 0.1 Bar). Complete mixing is achieved in 10ms. In this device, we present stop-flow study on complimentary single strain-DNA reactions and on ELISA reaction. We present a second process involving electrokinetic fluid flow mixing where the method consists in initiating a flow instability that will rapidly stir the microflow streams. Depending on the fluids properties, we induce AC-electrothermal or AC-electroosmotic flow to manipulate the fluids. In this device, we show about an order of magnitude enhancement for biological reaction time. In the present study we present some measurements of the mixing behavior. We discuss the advantages of each process and show some quantitative results on biological reactions enhancement.

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