

Abstract Submitted
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Flow-modulated ssDNA reaction in microchannels¹ THOMAS JOHN, University of California, Santa Barbara, IGOR MEZIC, University of California, Santa Barbara — We model the recombination of very-short-strand DNA in microchannels with the assumption that two complementary strands will combine only if they are close together in position as well as alignment. We describe this as a reaction-advection-diffusion system in position-orientation space with avenues for control in the form of velocity fields and external potentials. We prove that, without reaction, chaotic (uniformly and non-uniformly hyperbolic) flows can lead to simultaneous mixing of the strands and their alignment. We develop numerical simulation of the process showing that reaction is enhanced by chaotic mixing. We analyze the dynamics in a flow caused by an active (shear superposition) micro-mixer.

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