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Using Microfluidics to Investigate Reaction-diffusion Phenomena in Simple Flows

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We report new experimental and theoretical results on the problem of reaction-diffusion in a microfluidic chip. The chemical reactor under study is a T-shaped microchannel (about 200 μm wide and 10–20 μm deep) in which the two analytes are bring into contact at a constant flow rate. In the interdiffusion zone, the local concentration of the reaction product is measured using optical epi-fluorescence. To extract useful informations about the reaction kinetics, one needs to model the reaction-diffusion zone and compare the simulations with the experiments. We show that such a microfluidic device is a well-suited method to access fast chemical kinetic rates.

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