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Manipulation of microfluidic drops with laser patterns: Stationary and non stationary effects MARIA-LUISA CORDERO, EMILIE VERNEUIL, LadHyX, Ecole Polytechnique, France, FRANCOIS GALLAIRE, Laboratoire Dieudonne, Universite de Nice, France, DANIEL BURNHAM, DAVID MCGLOIN, University of Dundee, UK, CHARLES BAROUD, LadHyX, Ecole Polytechnique, France — Control over individual microfluidic drops can be achieved through Marangoni flows when a thermal gradient is created along the drop surface through laser heating. The maximum force induced by the Marangoni force is measured at $F_m \approx 200$ nN. A drop advancing in a microchannel can be blocked if F_m is higher than the drag from the external flow and if the transit time of the interface through the laser waist (τ) is longer than $\tau_m = 5$ ms. Velocity and temperature field measurements show that the formation time of the thermocapillary flow correlates with τ and that τ_m is determined by the time required to establish the thermal gradient. The production of complex laser patterns extends the limits of the technique: Stationary spatial laser patterning with holographic techniques can be used to stop faster drops, since the heated zone is larger. On the other hand, non stationary patterns obtained with scanning mirrors can produce the same blocking with a lower mean power.

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