

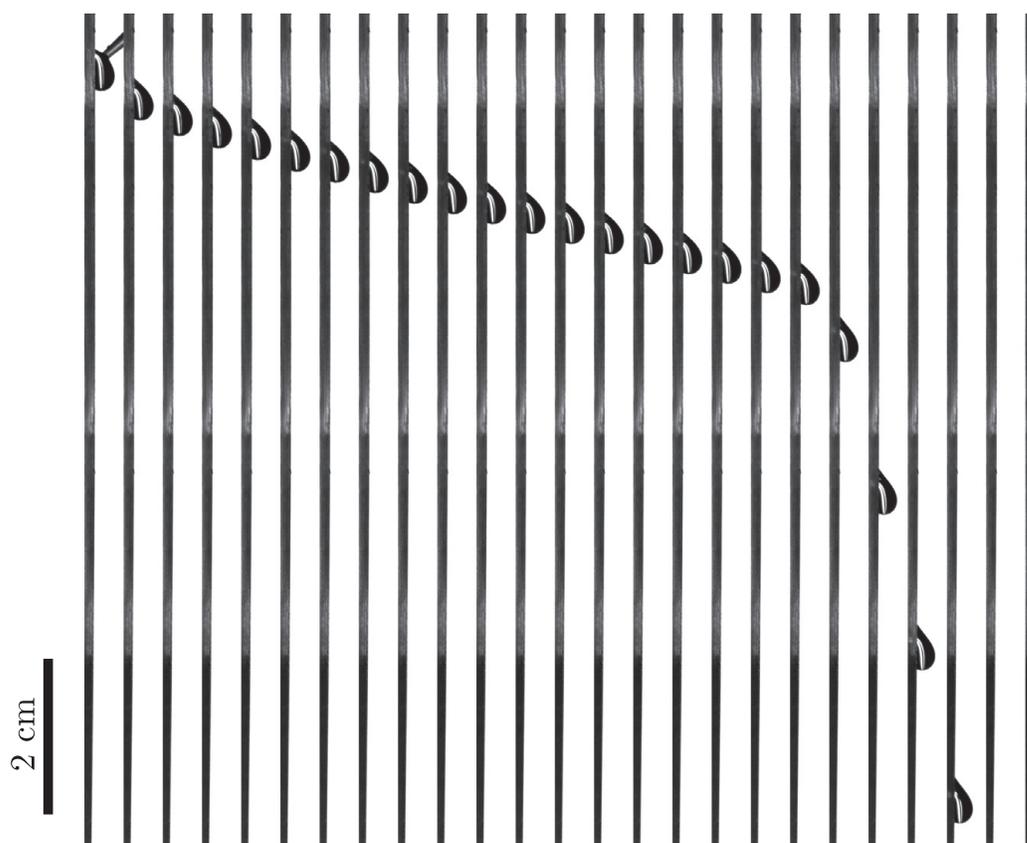
Electronic Supplementary Information

Role of uncrosslinked chains in droplet dynamics on silicone elastomers

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Video SV1: Droplet dynamics on a PDMS plate

Video SV1 corresponds to the experiment shown in Fig. 1: A 40% water - 60% glycerol mixture droplet of volume $21.5 \mu\text{L}$ is deposited with no initial speed on a vertical PDMS surface. Two regimes with two different constant speeds are identified.



Snapshots shown here are taken every second.

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Video SV2: Rolling motion observed in the droplet in both the first and second speed regime

Cacao particles are incorporated to a 40% water - 60% glycerol mixture droplet of volume $17 \mu\text{L}$ to track the motion inside the droplet, when deposited on a PDMS plate. The motion of one aggregate of cacao particles (more visible on the video than smaller cacao particles) is isolated using red circles. (a) Motion during the first regime. Snapshots are taken every second. (b) Motion during the second regime. Snapshots are taken every 0.2 second. In both regimes we observe a rolling motion: the speed transition is not explained by a sliding to rolling transition.

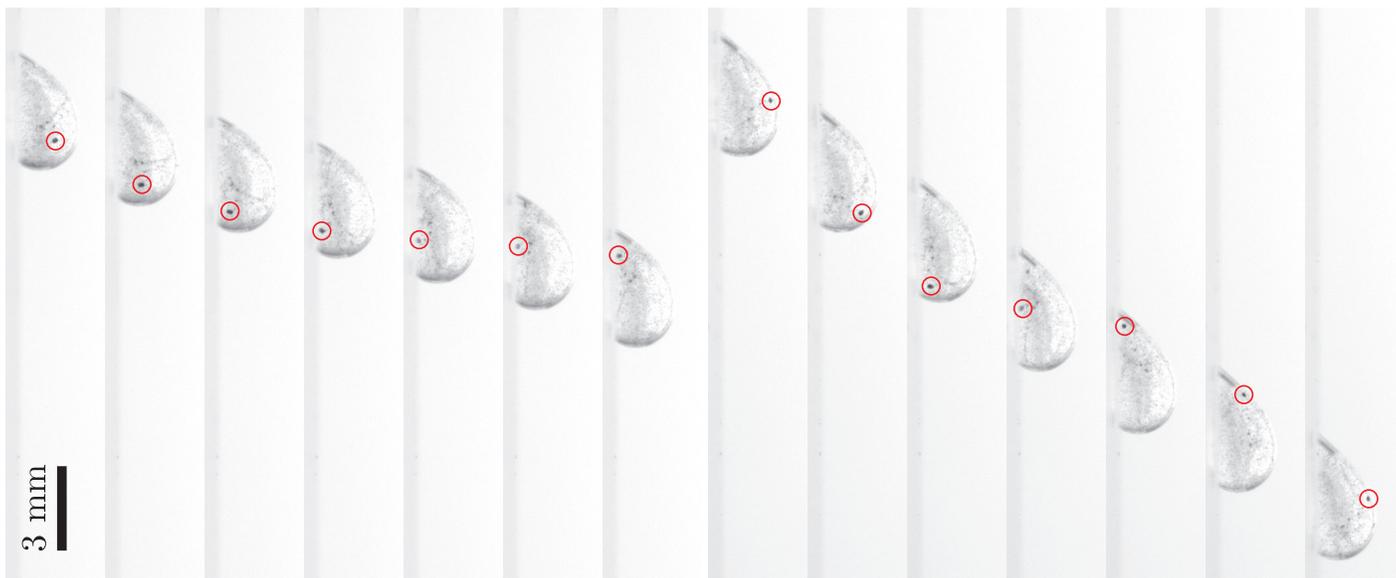
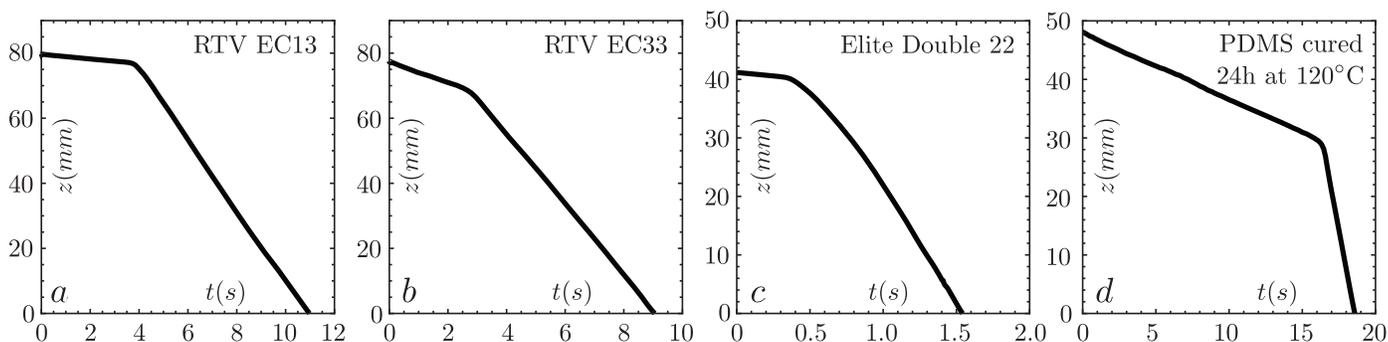


Figure S1: Droplet dynamics on several silicone elastomers

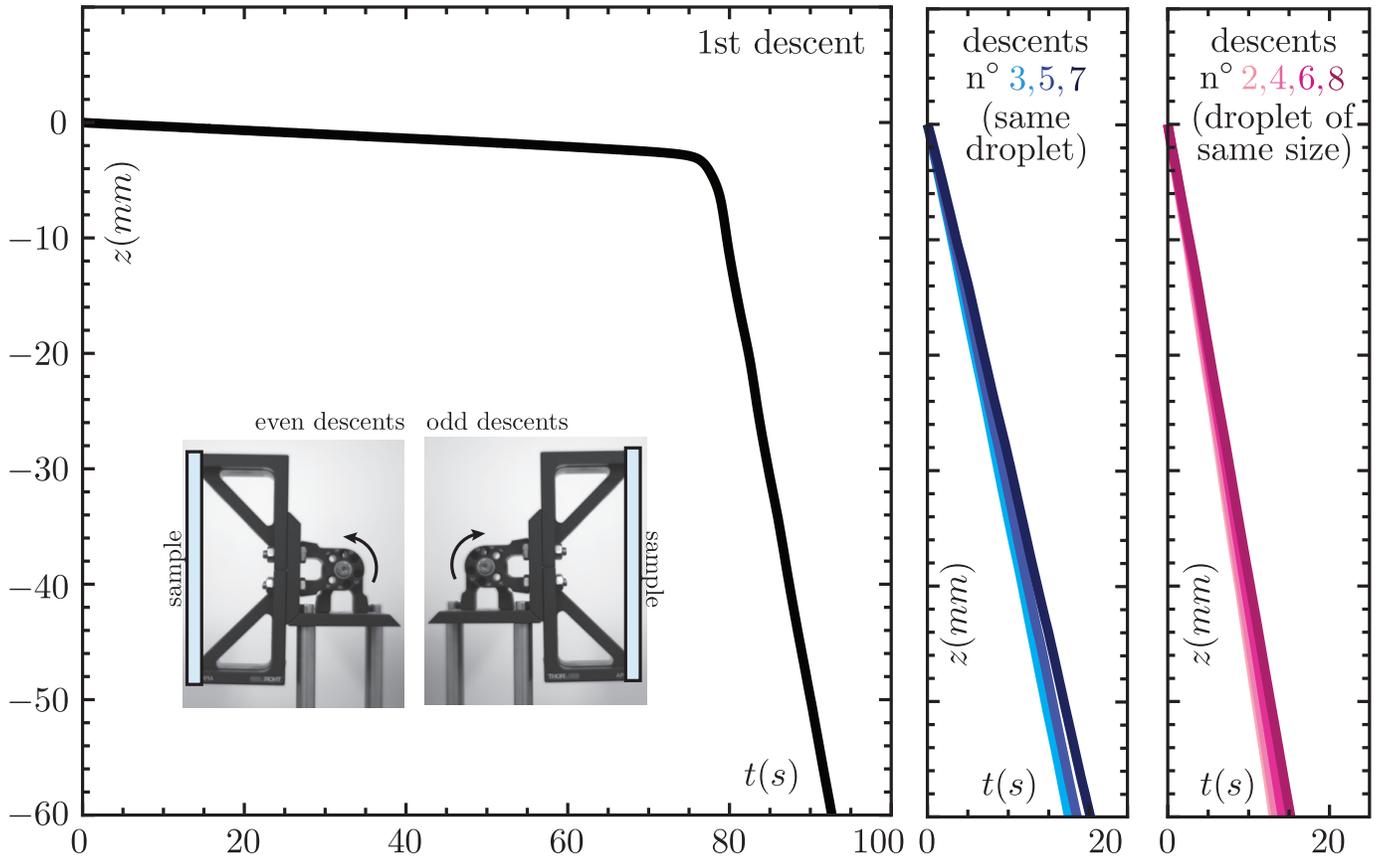
Although a special focus is given in our article on droplet dynamics on Dow Corning Sylgard 184 PDMS, we show here that the droplet dynamics also exhibits two regimes on several other silicone elastomers. The employed elastomers are RTV EC13 and EC33 from Esprit Composite, Elite Double 22 from Zhermack, and Sylgard 184 PDMS from Dow Corning.



(a) 40% water - 60% glycerol mixture droplet of volume $18 \mu\text{L}$ deposited on a RTV EC13 plate. (b) 40% water - 60% glycerol mixture droplet of volume $21 \mu\text{L}$ deposited on a RTV EC33 plate. (c) 50% water - 50% glycerol mixture droplet of volume $15 \mu\text{L}$ deposited on an Elite Double 22 elastomer sheet of $147 \mu\text{m}$ thickness laying on a plastic cover. (d) 40% water - 60% glycerol mixture droplet of volume $14 \mu\text{L}$ deposited on a Dow Corning Sylgard 184 elastomer sheet of around $100 \mu\text{m}$ thickness laying on a glass slide, cured during 24h at 120°C .

Figure S2: Turning the setup upside down to re-use the same droplet

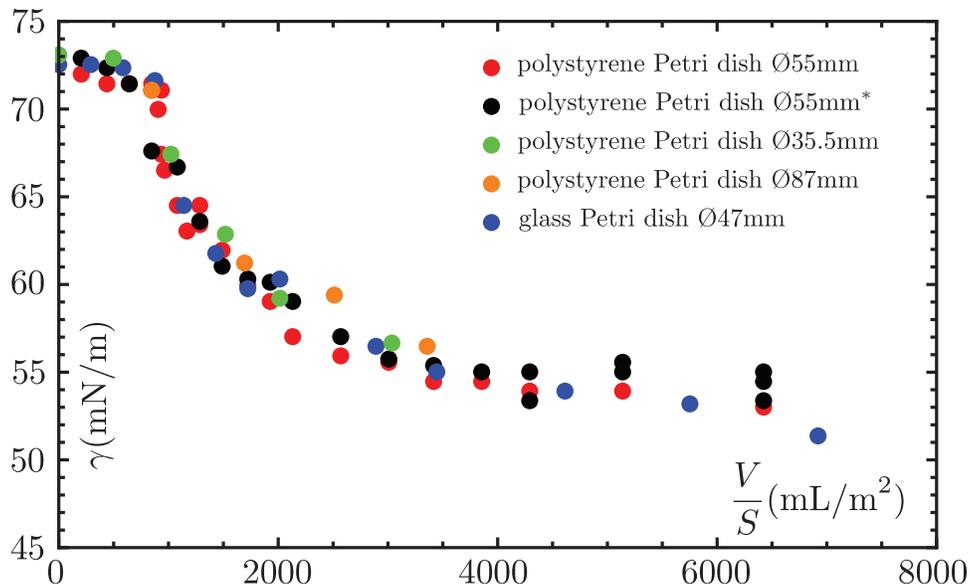
Turning the setup upside down once a droplet is at the bottom of our sample allows us to re-use the same droplet on the same sample for several descents. We show here that the behavior of the droplet during the first descent is completely different from its behavior during the following descents. The first descent exhibits two distinct regimes, whereas the following descents only exhibit one regime, corresponding to the second regime of the first descent.



A 40% water - 60% glycerol mixture droplet of volume $15 \mu\text{L}$ is deposited on a Dow Corning Sylgard 184 plate, attached to an adjustable angle mounting (Inset). The deposition is performed on a plate in the horizontal position, and the adjustable mounting angle is alternatively set to 0° and 180° to re-use the same droplet for several descents. $z = 0$ corresponds for each trajectory to the height of the droplet at the beginning of each descent. The first descent comprises 2 regimes, while the following descents exhibit only one single regime, at the speed corresponding to the second regime of the first descent. We record the odd descents (n° 1 (black), 3 (light blue), 5 (medium blue), 7 (dark blue)) for one single droplet. However, due to video acquisition constraints, the even descents (n° 2 (light rose), 3 (medium/light rose), 5 (medium rose), 7 (dark rose)) are recorded for one other droplet, all parameters being kept constant between the two experiments. The small variability on the droplet volumes delivered by the micropipette explains the slight variation in speeds between the odd and even descents experiments: the droplet used for the even descents was a few percent larger in volume than the droplet used for the odd descents. Inside each set of descents (3,5,7) and (2,4,6,8), the droplet constant speed decreases slightly as a function of the number of the descent: this can be explained by a small decrease of the droplet volume by evaporation.

Figure S3: Surface tension measurements performed in Petri dishes of various sizes and made of various materials

We perform the same experiments as the one shown in Fig. 3b with different Petri dish sizes and different Petri dish materials to check the reproducibility of these results. We plot the evolution of the surface tension measured in different kinds of Petri dishes as a function of the volume of droplets collected rescaled by the surface of the Petri dish.



The first experimental data set, presented in red, corresponds to Fig. 3b. For this data set, we use a 55 mm polystyrene Petri dish, and we pre-fill the Petri dish with water only for volumes too small to form a flat interface (necessary for the surface tension measurements). The second set of experiments, shown in black, is the same experiment, but with pre-filling the Petri dish with water for all volumes. The third and fourth sets of experiments, in green and orange, are performed with Petri dishes made of the same material but of different sizes, and the last set of experiments, in blue, is carried out with a glass Petri dish. The collapse of all the rescaled data shows that there is no influence of the Petri dish material on the measured surface tension, and that the surface of the Petri dish is the good parameter for a rescaling. This collapse excludes the hypothesis of having some PDMS chains stuck on the material constituting the Petri dish during the experiment (oil have a very different wetting behavior on polystyrene than on glass: if some chains were stuck on one of these Petri dish materials, the surface concentration in PDMS would be lower, and the surface tension transition would occur for a larger volume).