Electronic Supplementary Material (ESI) for Soft Matter.

Water ring-bouncing on repellent singularities

Supplementary information

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We enclose here a few supplemental figures and movies, following the development of the accompanying paper.

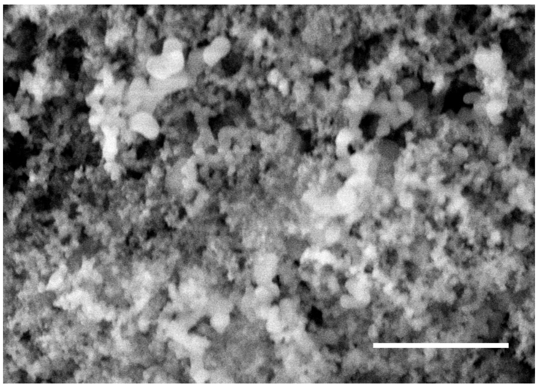

Figure 1: SEM image of the textured substrate showing agregates of colloidal beads of typical size 20nm. The scale bar corresponds to a length of 500 nm.

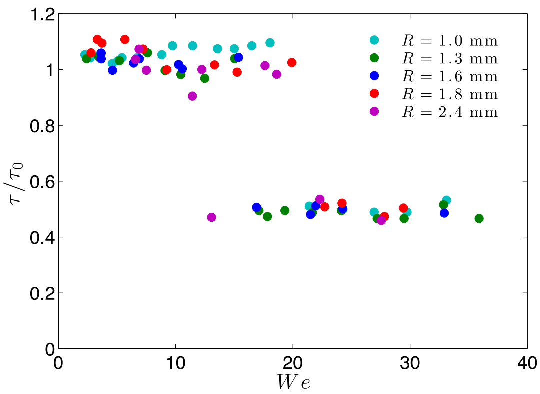

Figure 2: Contact time τ on a macrotextured substrate normalized by the contact time τ_0 on a regular material as a function of the Weber number. When the Weber number reaches a critical value We* = 20 $\pm$ 2, τ is reduced.

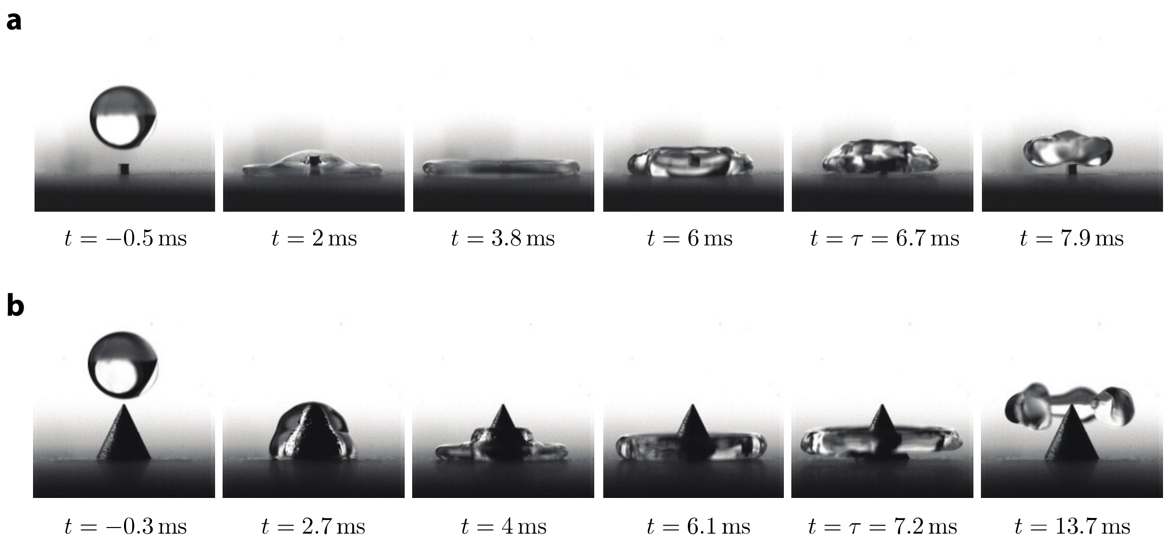

Figure 3: **a** A drop with radius R = 1.3 mm impacts (V = 1.2 m/s) a repellent pillar with height and width 400 µm. The drop bounces as a ring after 6.7 ms, a time much shorter than a similar impact on a regular superhydrophobic substrate. **b** Impact at velocity V = 0.91 m/s of a water drop with radius R = 1.3mm on a superhydrophobic cone with height and width 2 mm. The liquid leaves the substrate after 7.2 ms in the shape of a torus.

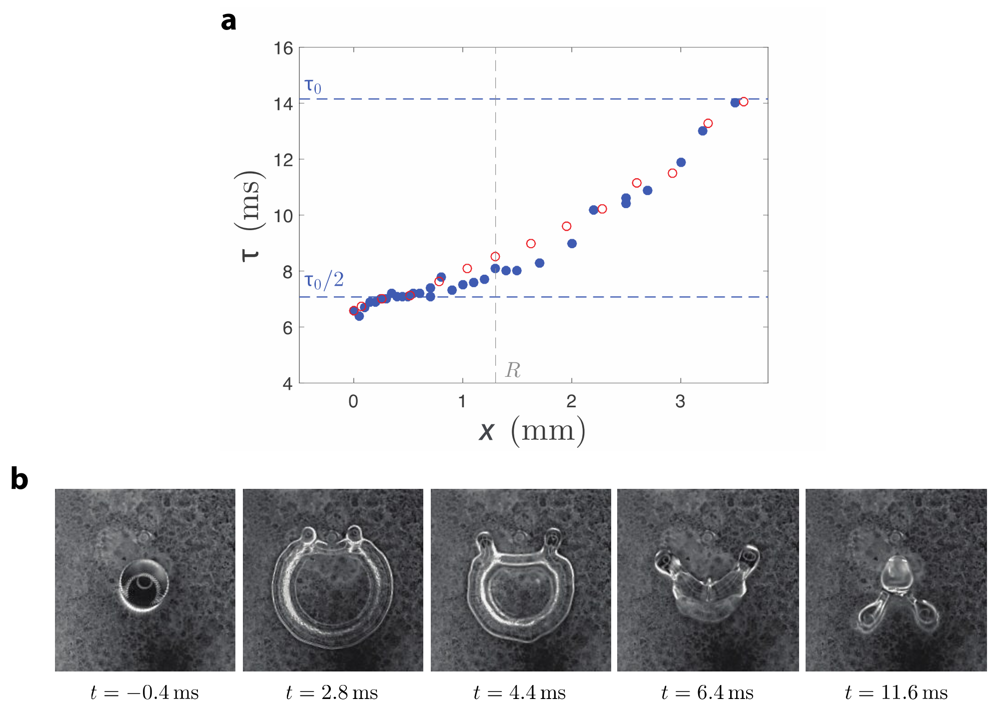

Figure 4: **a** Contact time τ as a function of the offset x. Experimental data and simulations are displayed with blue filled and red empty circles respectively. The reduction of contact time is significant for x even larger than R. **b** Top view of an off-center impacts (R = 1.3 mm) on a silicon wafer textured by a glass bead of diameter d = 400 µm. The droplet is offset by x = 2.5 mm. The contact time is τ = 10.6 ms.

Movie S1: High-angle shot of a water droplet with radius $R = 1.6$ mm impacting the point-like defect ($r = 200$ µm) at $V = 1.2$ m/s (centered impact). The drop takes off as a ring at time $\tau = 10.3$ ms.

Movie S2: Simulation of a drop with radius $R = 1.3$ mm impacting the point-like defect ($r = 200$ µm) at $V = 1.28$ m/s. The drop takes off a in a ring shape after 6.7 ms in quantitative agreement with experiments.

Movie S3: Cross sections of the impact presented in Movie S2. We observe that the outer bulge carries dominant momentum so that it generates obliquity in the cross section of the departing ring.

Movie S4: Visualization of the velocity field inside the drop for the impact shown in movie S1. We see that the collision between the rims moving in opposite direction is the mechanism that generates upwards momentum.

Movies S5 and S6: Water droplet ($R = 1.3$ mm) impacting at $V = 1.3$ m/s a bead with diameter $r = 200$ µm, with off-centering $x = 0.7$ mm. The left part of the drop takes off after 5.7 ms, while the larger right part departs at $\tau \approx 7.4$ ms. Cross-sections obtained from simulations quantitatively match experiments.

Movies S7 and S8: Top and side views of an ethanol drop ($R = 0.93$ mm and $V = 0.7$ m/s) impacting a groove of width $W = 2.2$ mm. The droplet reaches a maximal extension l_{max} and it bounces as a cylinder after 7.2 ms, a time shorter than τ_0, the contact time on a flat surface.