Supporting Information

Nanofluid droplet impacting on the rigid and elastic superhydrophobic surfaces

Chenlu Qian[#], Xiaoyang Li[#], Qiang Li[*], Xuemei Chen[*]

MIIT Key Laboratory of Thermal Control of Electronic Equipment, School of Energy and Power Engineering, Nanjing University of Science and Technology, Nanjing 210094, China.

[#]The authors contributed equally to this work.

Correspondence and requests for materials should be addressed to Q.L. (email: liqiang@njust.edu.cn) or to X.C. (email: xuemeichen@njust.edu.cn)

Table S1. Dimension parameter of the micropillars array on the hierarchical micro/nanostructured superhydrophobic Cu surface.

Surface	Length *a* (μm)	Spacing s (μm)	Height *h* (μm)
N	0	0	0
MN100	100	100	> 200
MN125	100	125	> 200
MN150	100	150	> 200

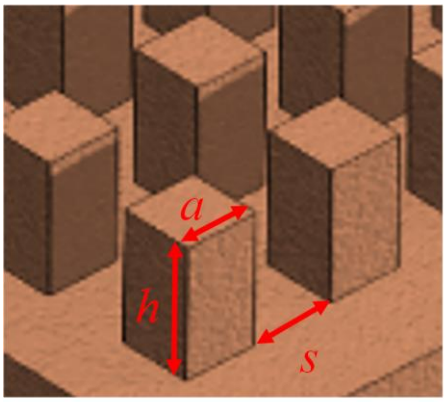

Figure S1. Schematic drawing of structure parameters of micropillars array on the hierarchical micro/nanostructured superhydrophobic Cu surface.

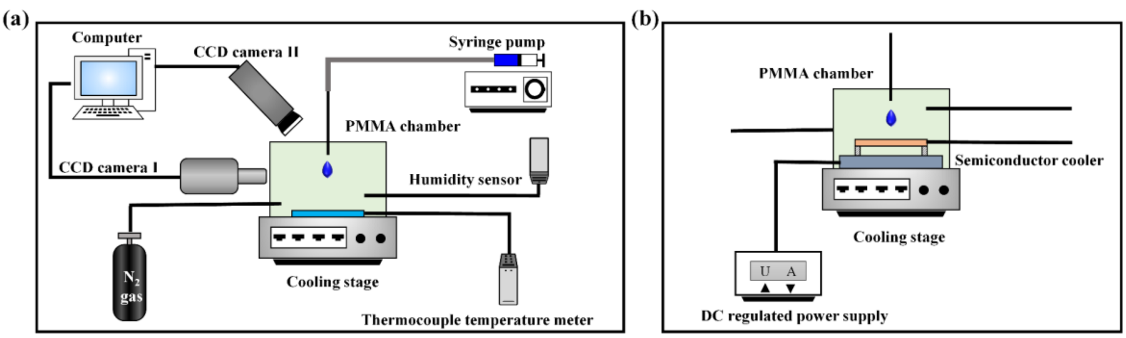

Figure S2. (a) The visualized experimental setup for nanofluid droplet impacting on the cold hierarchical micro/nanostructured superhydrophobic Cu surface. (b) The visualized experimental setup for nanofluid droplet impacting on the cold elastic PDMS superhydrophobic surface.

Section S1

Effect of nanoparticle concentration on the nanofluid droplet impacting dynamics on cold MN100 surface.

Figure S3 shows the dynamic process of nanofluid droplets with nanoparticle concentrations of 0.5 wt% and 1.5 wt% impacting on the MN100 surface at a velocity of 1.4 m/s. It can be seen that the nanofluid droplet with a nanoparticle concentration of 0.5 wt% detaches from the cold MN100 (-5 °C) at 15.8 ms; whereas nanofluid droplets with a nanoparticle concentration of 1.5 wt% bouncing off the cold MN100 surface at 15.4 ms at the same impacting velocity. The spreading ratio (D_{max}/D_0) is defined as the ratio of maximum spreading diameter (D_{max}) to droplet initial diameter (D_0). As can be seen in Figure S4a, when the nanoparticle concentration of nanofluid droplet increases from 0.5 wt% to 1.5 wt%, D_{max}/D_0 is in the range from 2.58 to 2.59. Figure S4b shows the contact time of the nanofluid droplet with the nanoparticle concentrations ranging from 0.5 wt% to 1.5 wt% on the cold MN100 superhydrophobic Cu surface. The contact time of nanofluid droplets varies between 15.8 ms and 16.1 ms. These results demonstrate the influence of the nanoparticle concentration on the nanofluid droplet impacting dynamic process is small enough that we can ignore it. Therefore, we select the nanoparticle concentration of 1 wt% to investigate the nanofluid droplet impacting dynamics in the manuscript.

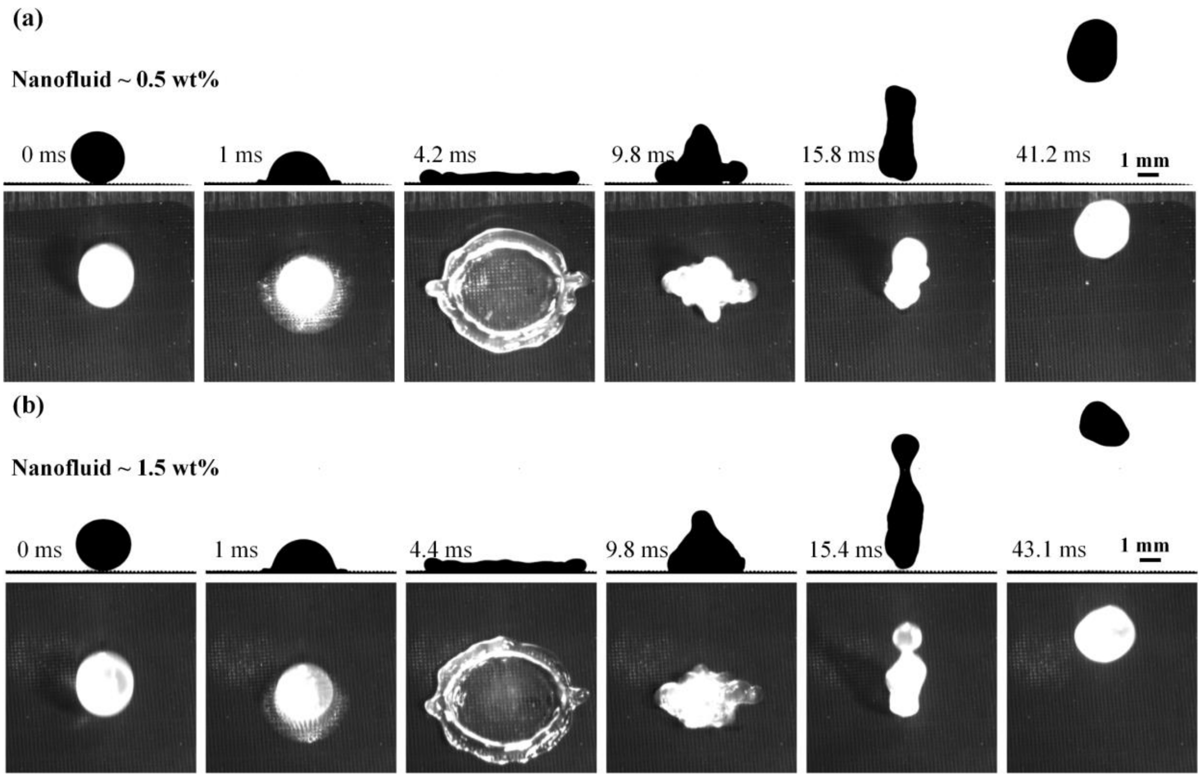

Figure S3. (a) Selected snapshots of a nanofluid droplet (0.5 wt%) impacting on the cold MN100 superhydrophobic Cu surface (-5 ℃) at a velocity of 1.4 m/s. (b) Selected snapshots of a nanofluid droplet (1.5 wt%) impacting on the cold MN100 superhydrophobic Cu surface (-5 ℃) at a velocity of 1.4 m/s.

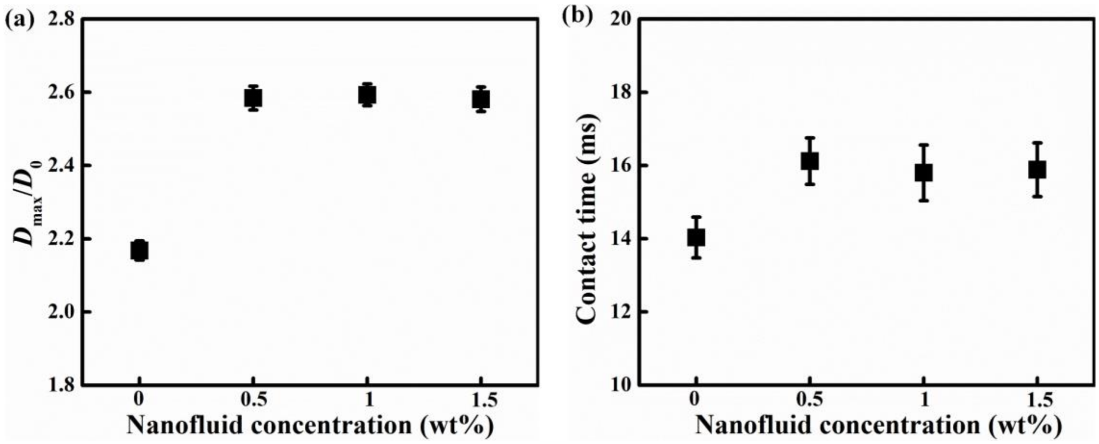

Figure S4. (a) Spreading ratio D_{max}/D_0 of the nanofluid droplet at a velocity of 1.4 m/s with the nanoparticle concentrations ranging from 0.5 wt% to 1.5 wt% on the cold MN100 superhydrophobic

Cu surface (-5 ℃). (e) Contact time of the nanofluid droplet at a velocity of 1.4 m/s with the nanoparticle concentrations ranging from 0.5 wt% to 1.5 wt% on the cold MN100 superhydrophobic Cu surface (-5 ℃).