Supporting Online Information

Facile approach to design a stable, damage resistant slippery, and omniphobic surface

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Supporting information

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Figure S1. Photo shows the distance between the substrate and the wick of the flame.

Figure S2. Schematic shows the steps involved in the fabrication of the slippery candle soot surface.

Figure S3. Soot particles SEM images a) without binder. b) with binder (RTV-1).

c) 2-D AFM image of soot surface (CS+RTV-1). d) 3-D AFM image of soot surface (CS+RTV-1).

Figure S4. SEM image of porous soot particles.

Figure S5. Nitrogen adsorption-desorption isotherms of porous soot particles.

Table: S1. Summary of structural parameters of the candle soot particles.

Scheme S1. a) Protection of terminal hydroxyl group of silanol b) Cross-linking of acetoxy groups in the presence of air moisture.

Figure S6. Contact angle of water on sample surfaces.

Figure S7. Mass loss of the slippery soot surface after water flowing tests

Video S1- Design Principle of SLIPS

Video S2-Superhydrophobic To SLIPS

Video S3- Repellency of various liquids with different surface tension including bood, milk and coffee.

Video S4- deicing under gravity

Video S5- Removal of ice with air at -20 °C

Video S6- Ice removal with tweezer

Video S7- Liquid Nitrogen-water cycle

Video S8- Super cold water

Video S9- Dip under ice

Video S10- Resistant to physical cuts.

Video S11- Resistant to tape peel and finger touch

https://drive.google.com/file/d/1juIfvPbpKJxtdcTOBNL584fm3WBfOHuI/view?usp=sharing

Please download the supporting information and video S10 , video S11 from the above link.

https://drive.google.com/open?id=1dQkJX1HWhkhGlTkDQjW6qj3WW2MGRbVK

10 Videos can be downloaded by using the above link

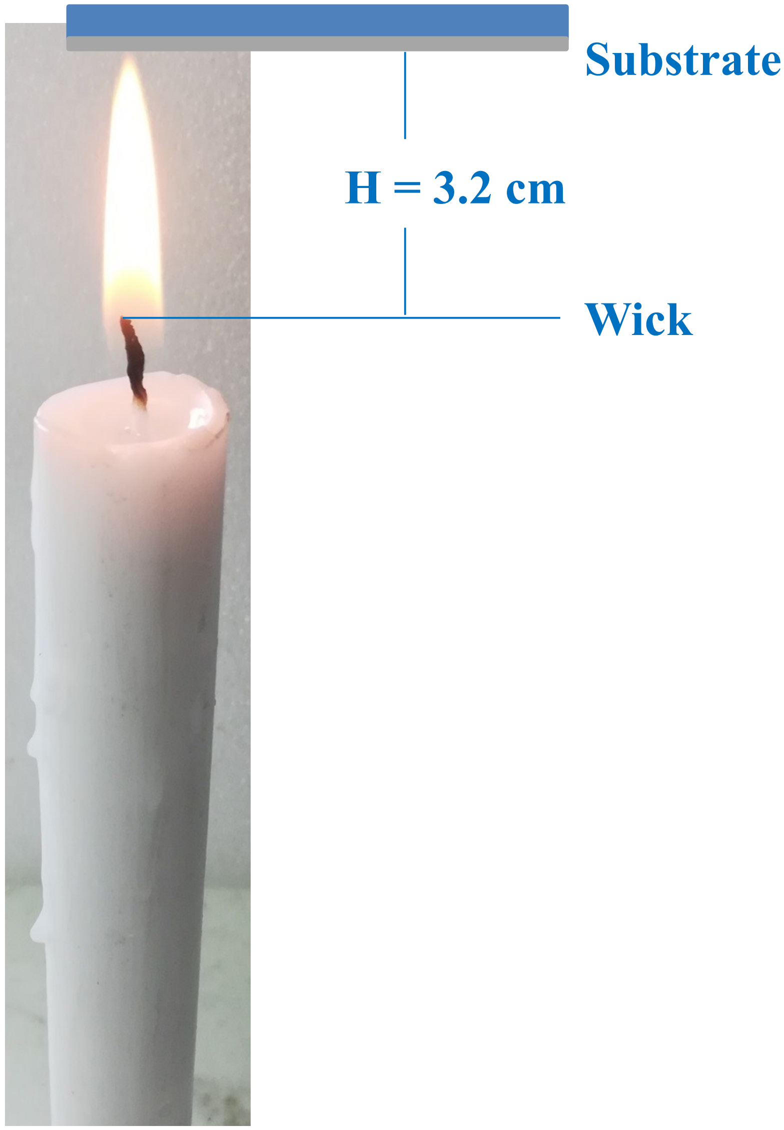


Figure S1. Photo shows the distance between the substrate and the wick of the flame.

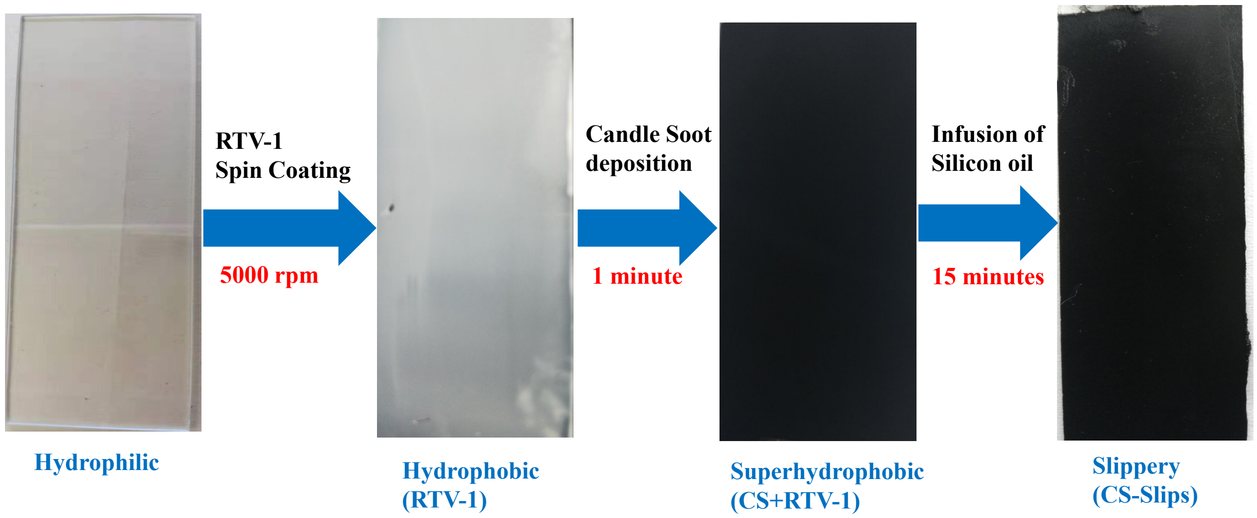


Figure S2. Schematic shows the steps involved in the fabrication of the slippery candle soot surface.

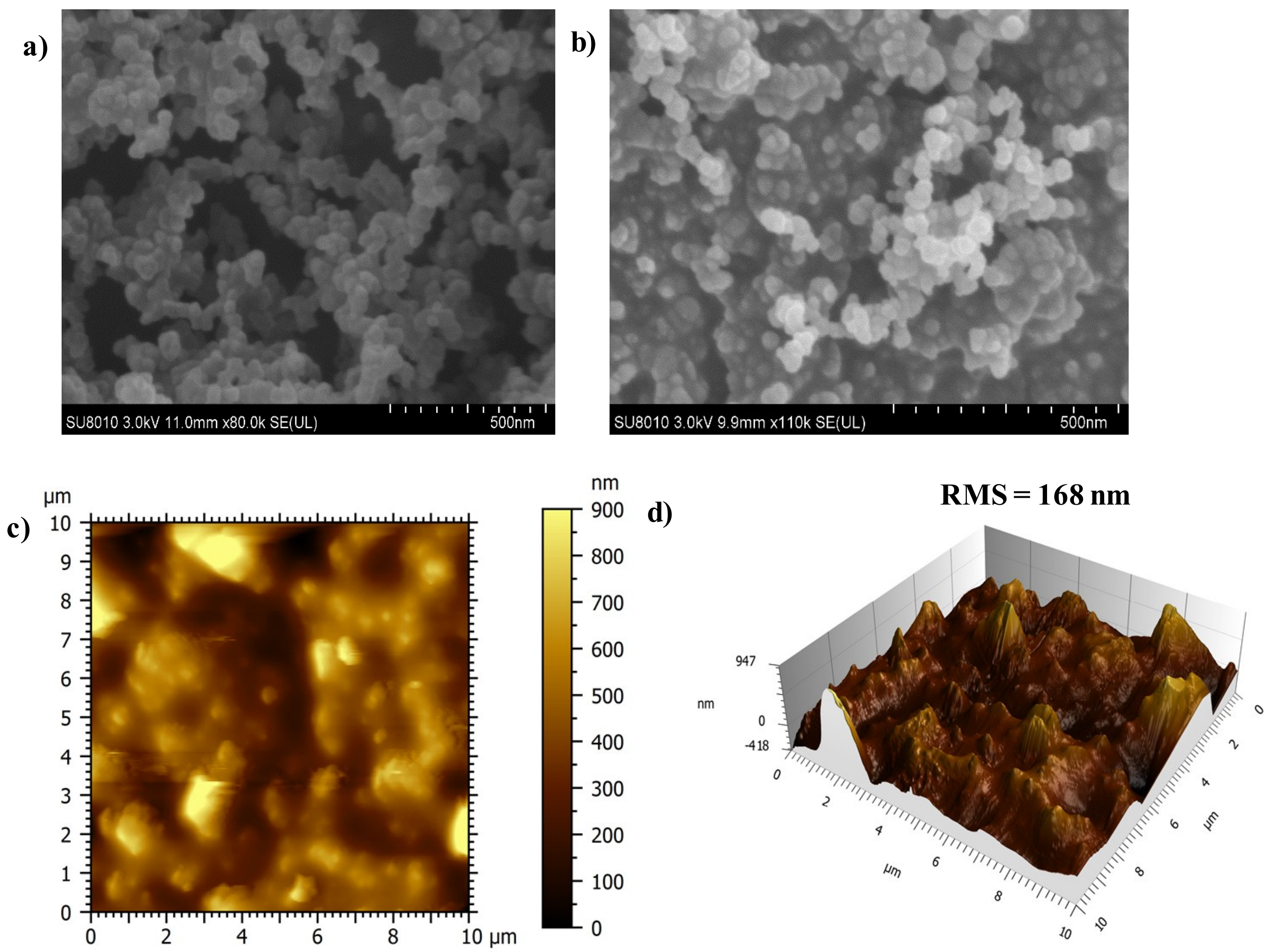


Figure S3. Soot particles SEM images a) without binder. b) with binder (RTV-1).

c) 2-D AFM image of soot surface (CS+RTV-1). d) 3-D AFM image of soot surface (CS+RTV-1).

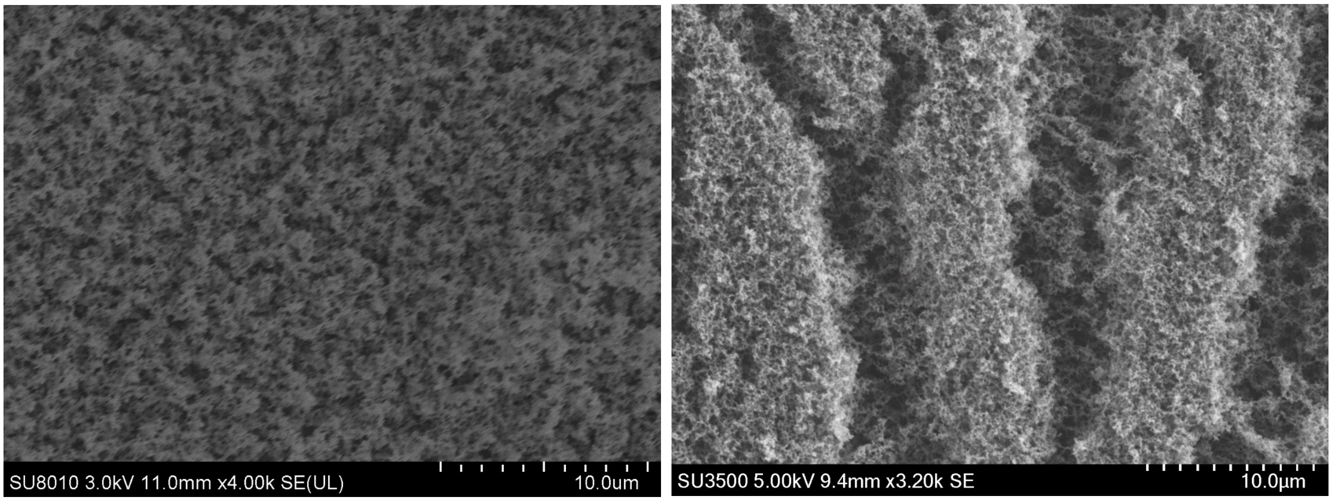


Figure S4. SEM image of porous soot particles

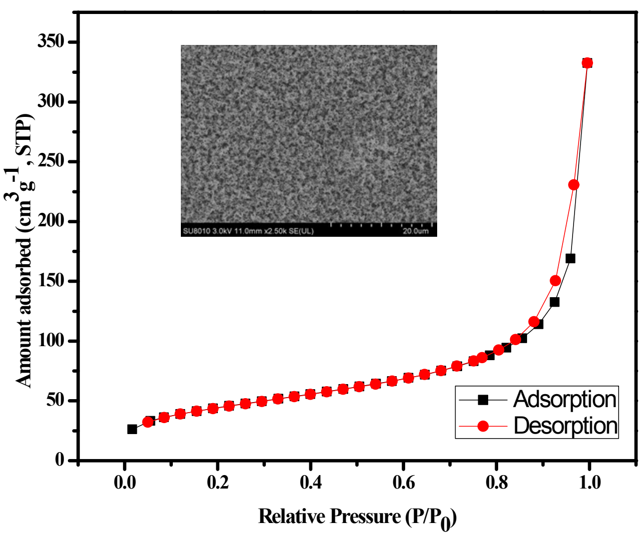
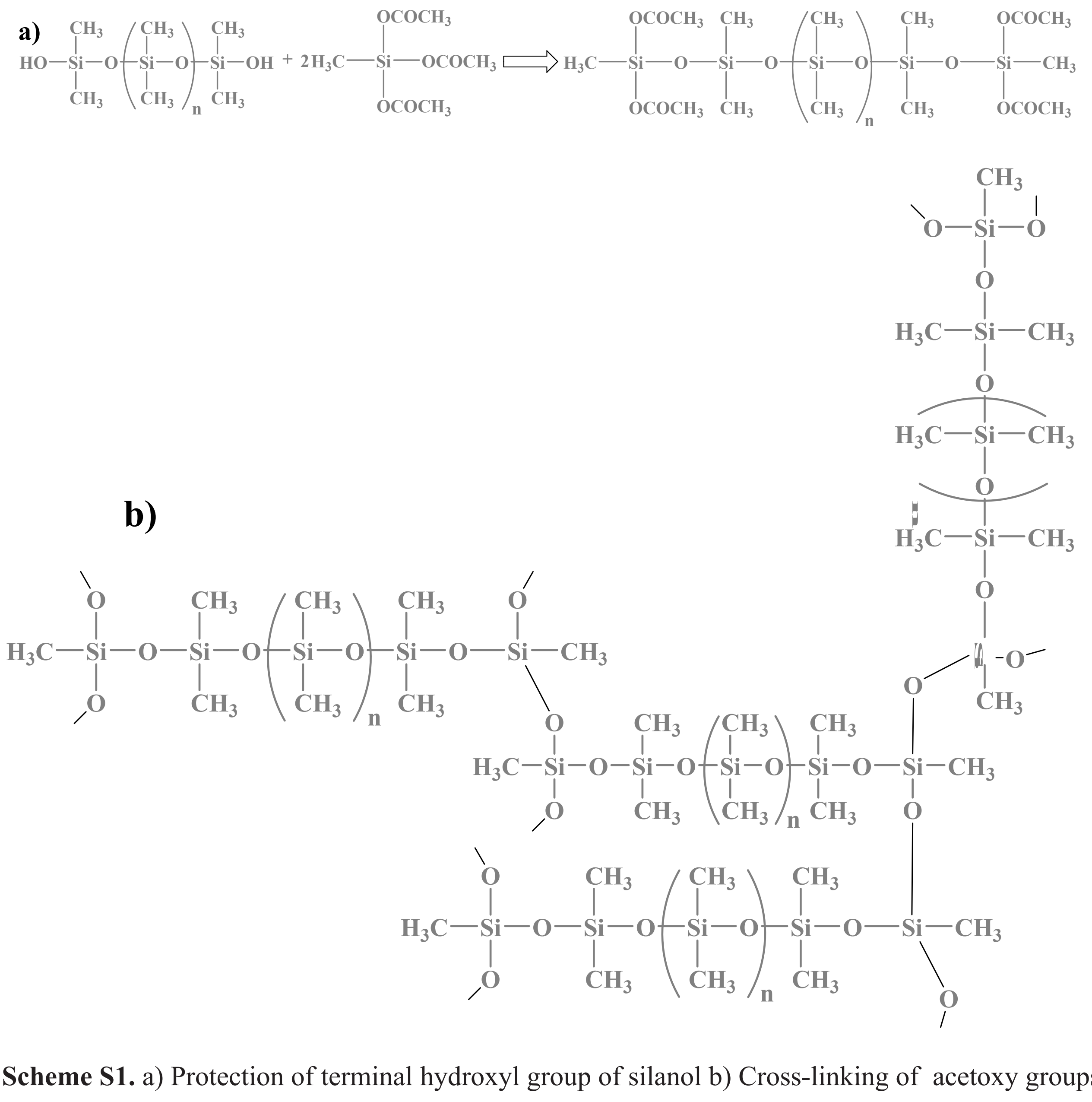


Figure S5. Nitrogen adsorption-desorption isotherms of porous soot particles.

Table: S1. Summary of structural parameters of the candle soot particles

S_{BET} (m^2/g)	S_{ext} (m^2/g)	V_t (cm^3/g)	V_{micro} (cm^3/g)	P_{BET} (nm)	P_{A-BJH} (nm)	P_{D-BJH} (nm)
156.66	138.19	0.5144	0.008115	13.1324	13.88	13.7809

S_{BET} = BET surface area; S_{ext} = t-Plot external surface area; V_t = Total pore volume; V_{micro} Micropore volume calculated by the t-plot method; P_{BET} = Pore width calculated by BET method; P_{A-BJH} = Adsorption average pore diameter by BJH method; P_{D-BJH} = Desorption average pore diameter by BJH method.



Scheme S1. a) Protection of terminal hydroxyl group of silanol b) Cross-linking of acetoxy groups in the presence of air moisture.

Terminal silanol are intermediates of the RTV-1 (room temperature vulcanizeable) silicones. RTV-1 is cross-linked due to moisture-sensitive functionalized silanes, in a two-step reaction. In 1st step, the silanol OH group is protected with acetoxy group and stored with acetoxy functionality as shown in the right side of the scheme (a). Now the two acetoxy groups present at each end of the silicone are particularly susceptible to hydrolysis. In 2nd step, a rapid crosslinking reaction takes in the presence of air moisture as shown in scheme (b).[1]

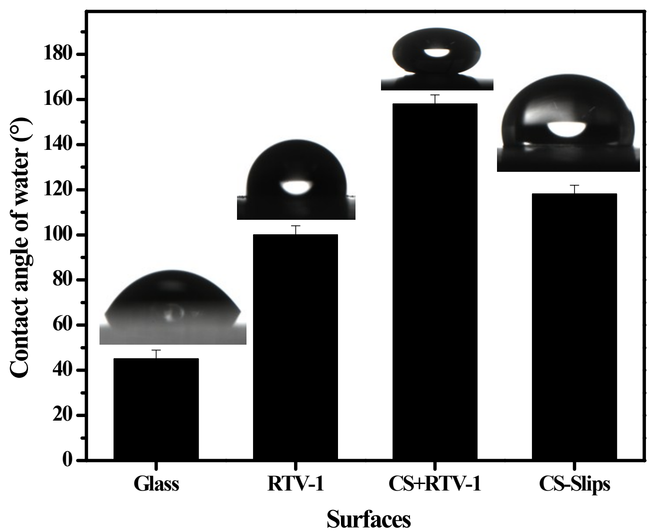


Figure S6. Contact angle of water on sample surfaces

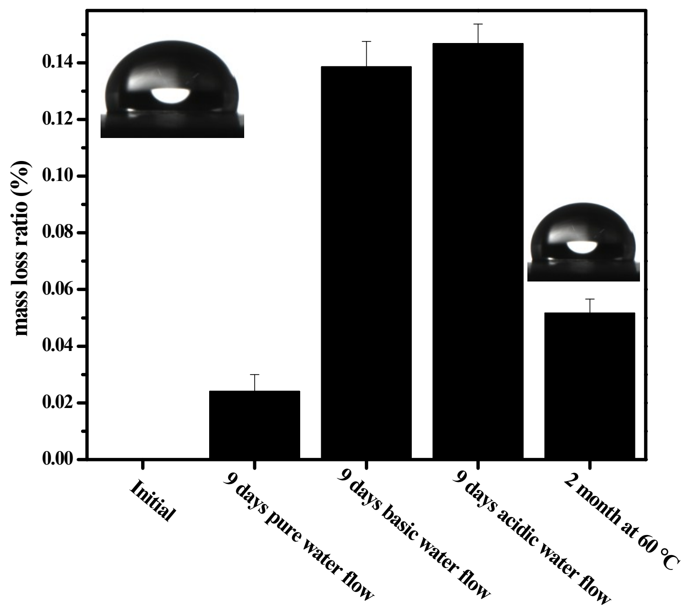


Figure S7. Mass loss of the slippery soot surface after water flowing tests

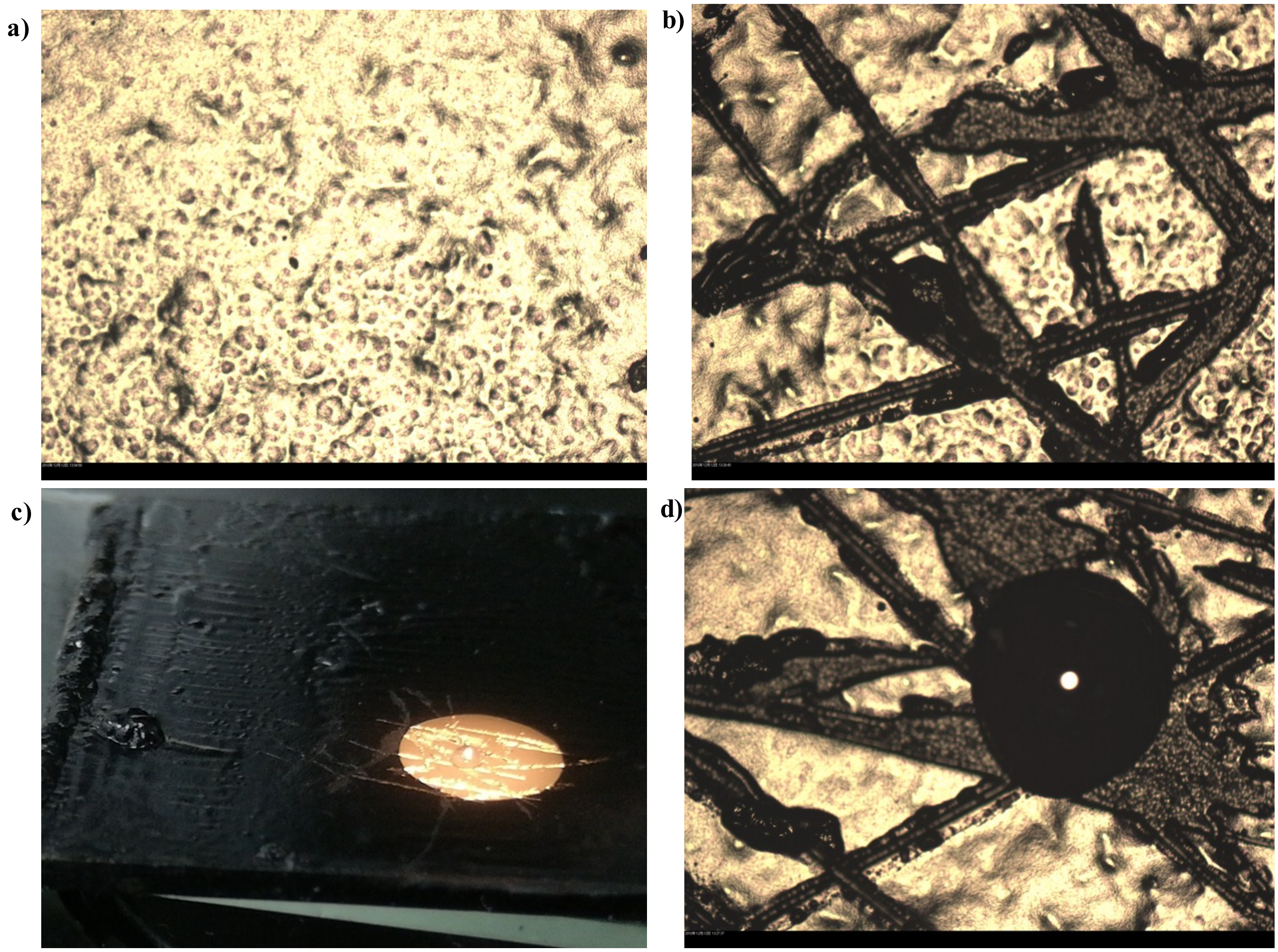


Figure S8. a-b) images clearly represent the difference between the pristine slippery soot surface and after applying cuts. **c-d)** images shows the no pinning of water drop even after applying cuts.

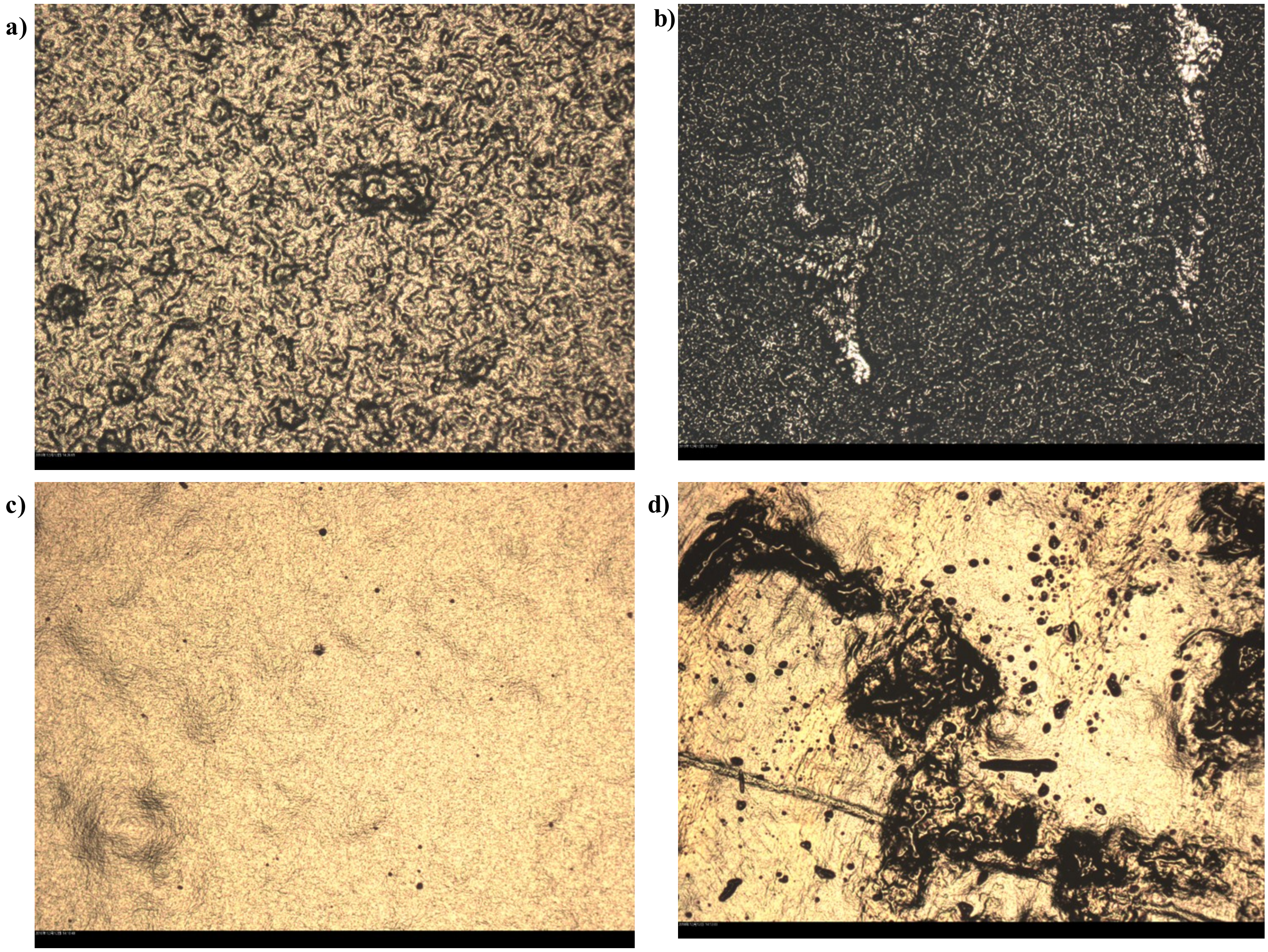
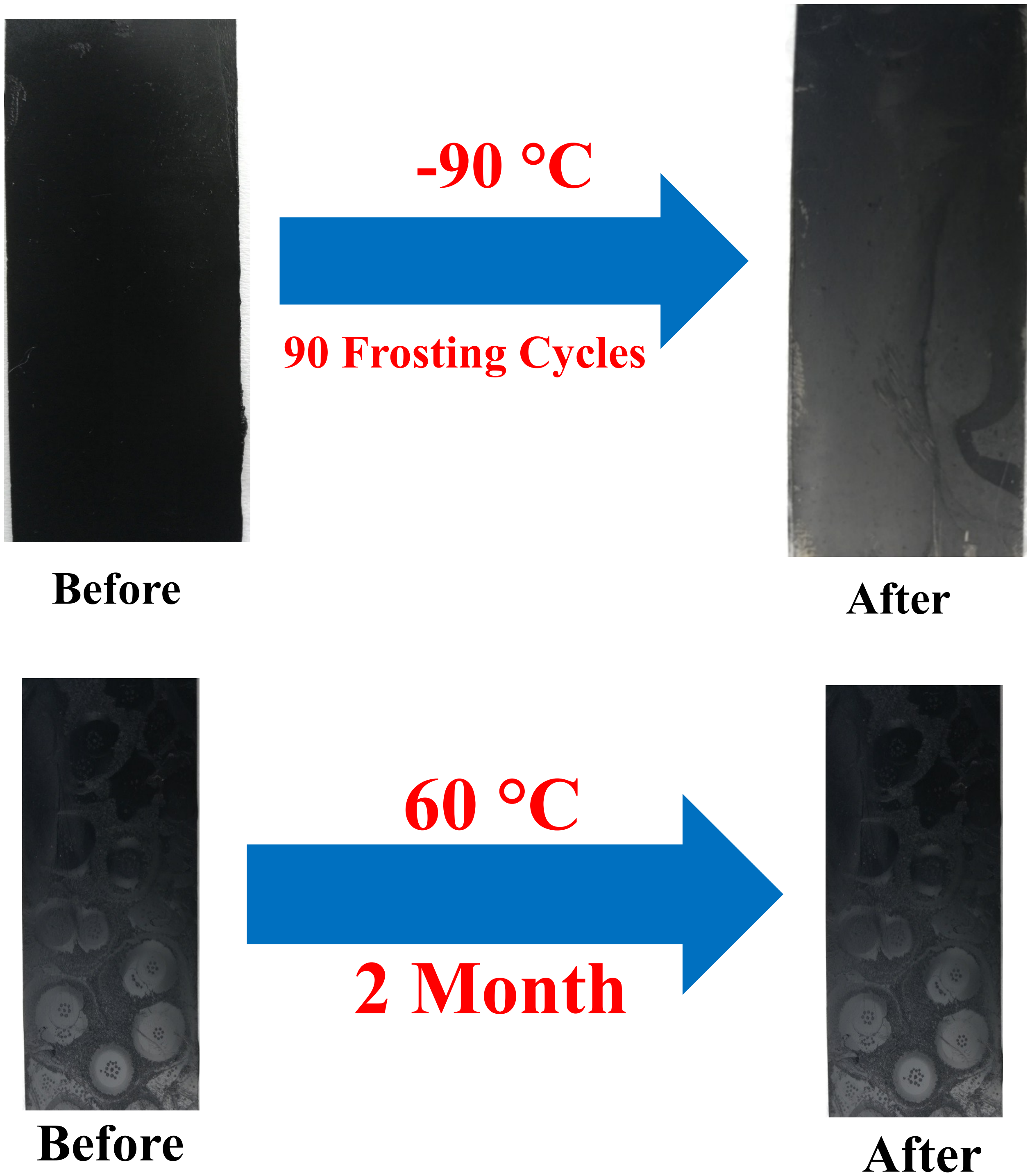
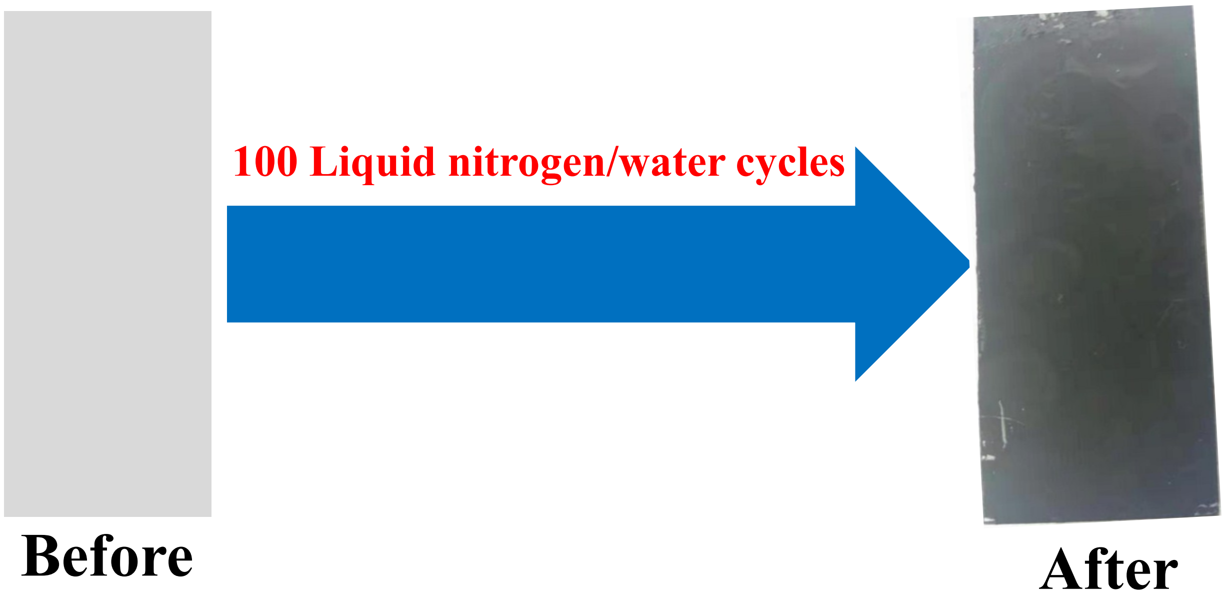


Figure S9. a-b) images clearly represent the difference between the pristine slippery soot surface and after pressing and tape peel. **c-d)** images clearly show the difference between the pristine slippery soot surface and after finger touching.


-90 °C
90 Frosting Cycles
Before
After
60 °C
2 Month
Before
After



(1) Gelest, I.; Arkles, B. C.; Larson, G. L. *Silicon compounds: silanes and silicones: a survey of properties and chemistry*, Gelest, Incorporated: 2008.