coatings

MDPI

Supplementary Materials: The Anti-Snow Behaviour of Icephobic Coatings: Laboratory and In-Field Testing

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Testing procedure for shear stress adhesion test.

Aluminum alloy bars were used as test samples; they were frozen in an aluminum alloy mold, in 40 ml of deionized water at−19 °C for at least 8 h. After this period, the mold was fixed into the machine and the sample was extracted from the ice with a speed of 4 mm/min.

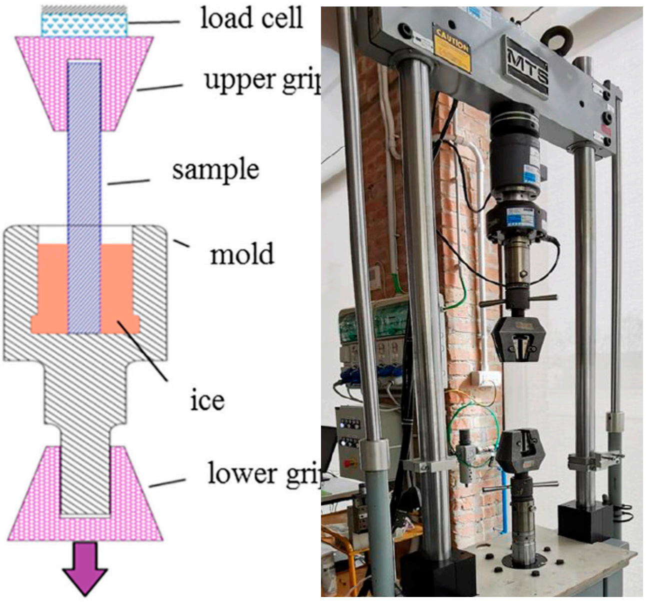

Figure S1. Schematic representation of the shear stress home-made apparatus and a picture of the tensile machine used.

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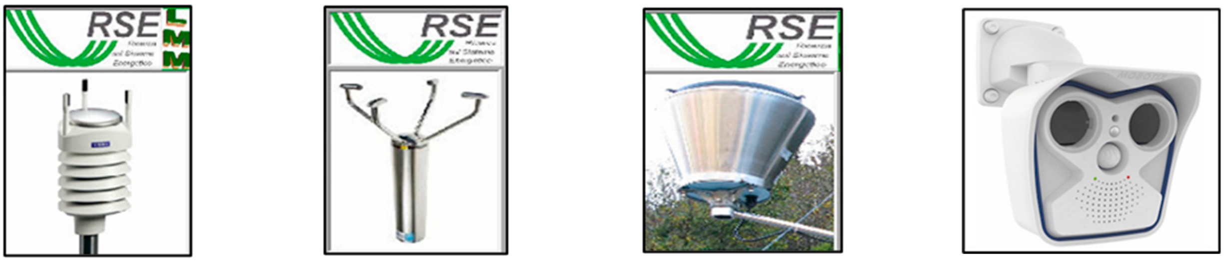
Figure S2. Wild outdoor test facility top view.



Vaisala Multi-variables for temperature and humidity

Sonic anemometer

Rain gauge

Webcam Mobotix

Figure S3. Monitoring devices in WILD station.

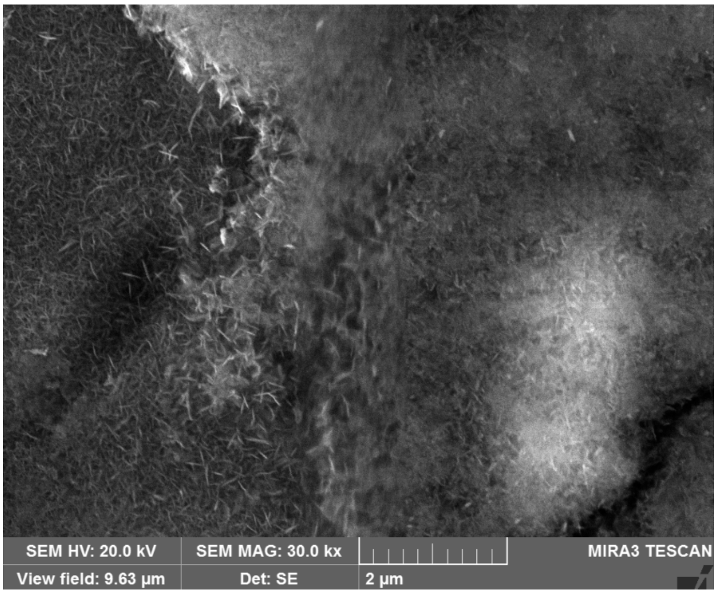


Figure S4. Morphology of the nanostructured pseudo-boehmite.

SEM image was collected at 30 kx magnification (Inlens).

Thickness estimation

The thickness of the boehmite layer was estimated using a relationship obtained in the work of Ryder et. al. "Andrew N. Rider (2001) The influence of porosity and morphology of hydrated oxide films on epoxy-aluminum bond durability, Journal of Adhesion Science and Technology, 15:4, 395–422, DOI: 10.1163/156856101300157524". The equation relates the oxide thickness and the boiling time of aluminum substrates. The thickness was obtained employing AFM measurements.
The equation is as follows:

$$y = 0.28 + 0.18 log x \qquad (1)$$

where $\boldsymbol{y}$ is the *thickness* of the oxide layer (μm) and $\boldsymbol{x}$ is the boiling time (min)

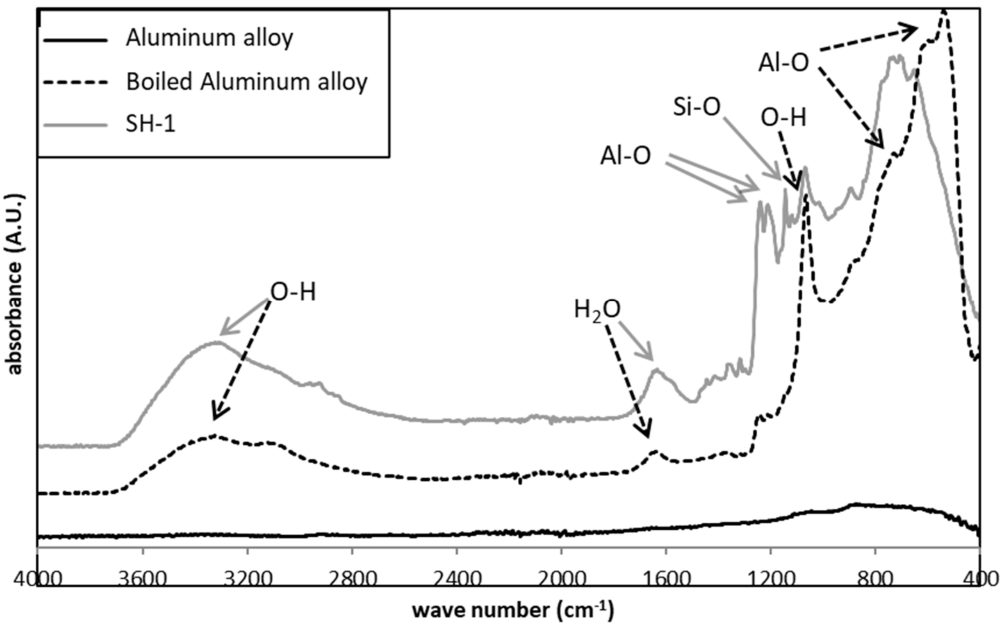


Figure S5. FTIR-ATR spectra of bare aluminum alloy, boiled aluminum alloy and SH-1. The main vibrational bands are indicated.

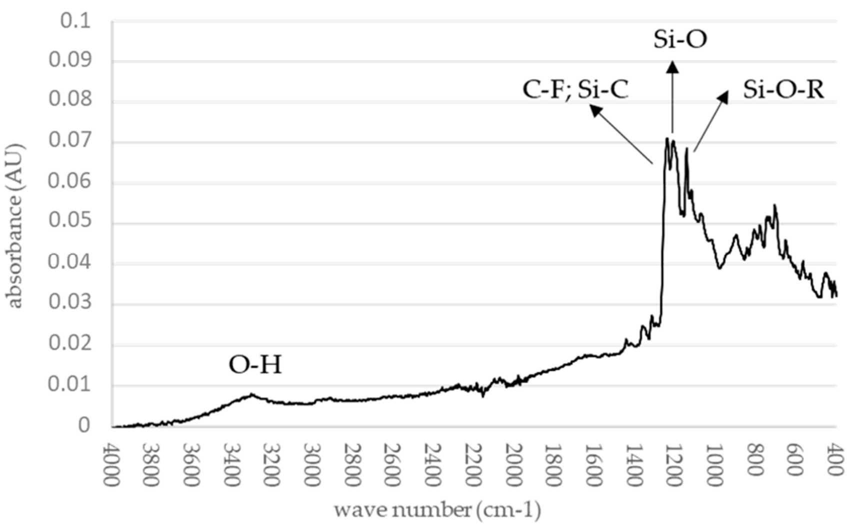


Figure S6. FTIR-ATR spectra of HP. The main vibrational bands are indicated.

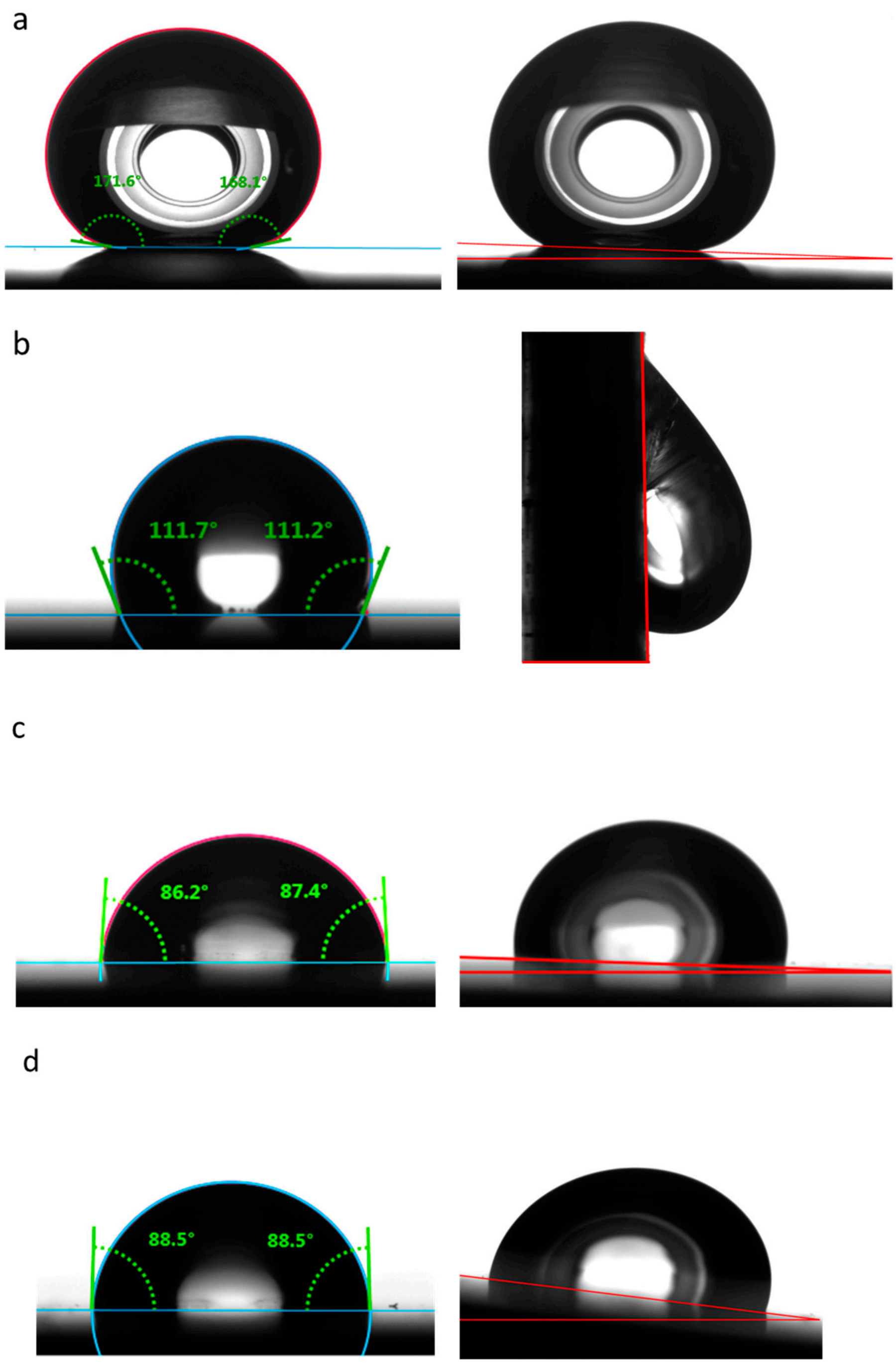


Figure S7. Typical water contact angles (WCA, left) and tilt angles (R-O or S-A; right) of: (**a**) SH; (**b**) HP; (**c**) SL-1; (**d**) SL-2.

Table S1. Meteorological and physical data recorded at the WILD station during the snowfall events.

Number of event	1	2	3	4	5	6	7	8	9
T_{ave}[°C]	−1.3	−0.3	−3.7	−0.6	−0.5	0.1	0.8	0.8	−0.4
T_{min}[°C]	−1.7	−0.9	−4.3	−2.1	−1.9	−0.7	0.6	0.4	−1.2
T_{max}[°C]	−0.8	0.7	−3.3	0.7	0.8	0.6	1.3	1.2	0.3
U_r min[%]	81	76	80	77	77	82	84	85	80
U_r max[%]	86	87	83	84	86	87	87	86	85
WE [mm]	45.8	12.2	12	26.8	22.8	20	17.4	9.8	8

H_{snow} [mm]	420	190	170	270	240	165	41	25	110
Density [kg/dm³]	0.11	0.06	0.07	0.10	0.10	0.12	0.42	0.39	0.07
Dry/wet	d	dw	d	dw	dw	dw	w	w	d
Max sleeve load [kg/m]	5	1.1	0.9	1.3	1.6	1.35	0.4	0.2	0.7
Max sleeve thickness [cm]	13.5	8	8	8	10	8	1.5	1	6

T_{ave}: average temperature; T_{min}: minimum temperature; T_{max}: maximum temperature; U_r min: relative umidity minimum; U_r max: relative umidity maximum; WE: water equivalent; H_{sow}: heigh of the snow deposition on the ground.