Supplementary Information

Enhanced Superhydrophobic Robustness of Black Silicon Employing Nanojungle

Structures

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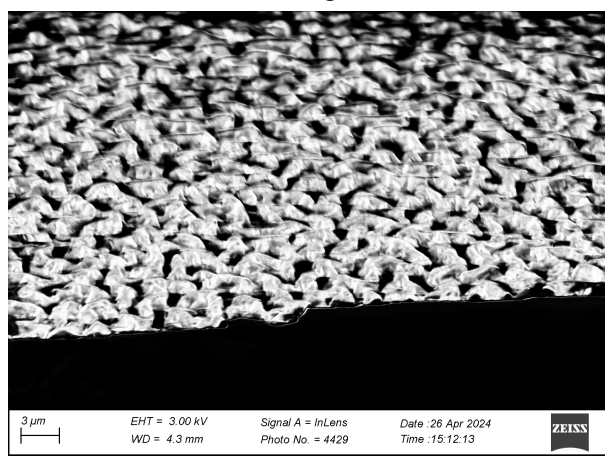[1]Department of Applied Physics, Aalto University, Espoo, Finland, 02150

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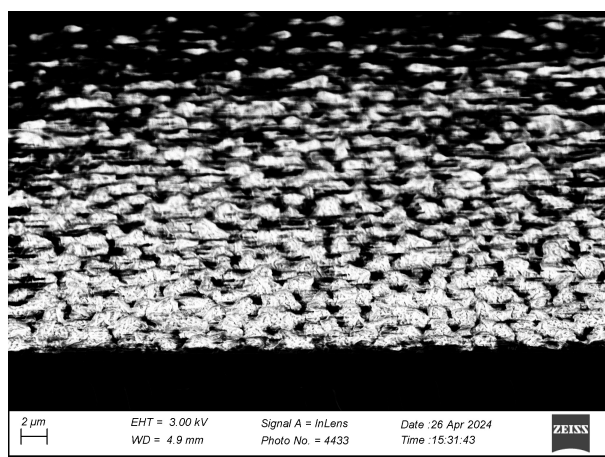
*Corresponding author: lingju.meng@aalto.fi; sami.franssila@aalto.fi
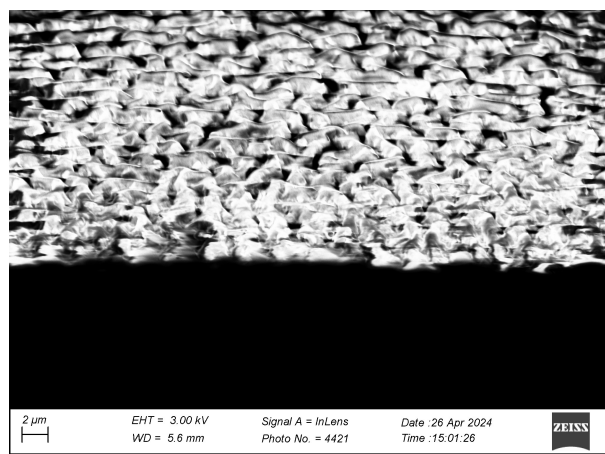
Photoresist film roughened for 5 mins

Photoresist film roughened for 10 mins


Photoresist film roughened for 30 mins

Figure S1: SEM micrographs of photoresist films roughened in RIE with different durations.
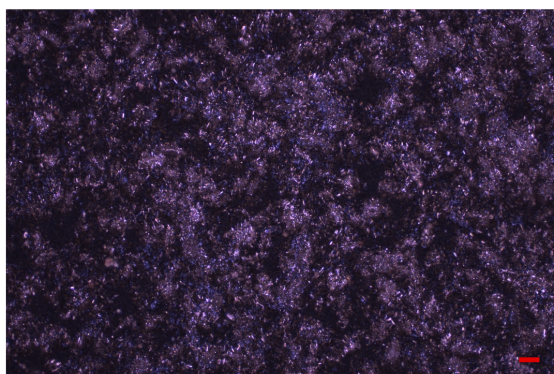
Nanograss b-Si fabrication:

The nanograss b-Si was fabricated with a cryogenic etching strategy on an ICP-RIE (Oxford Estrelas). The process temperature was -125°C and SF_6 (30 sccm) and O_2 (15 sccm) were utilized. The etching chamber pressure was set to 5 mTorr. The ICP power was 1500 W, while the forward power was 10 W.
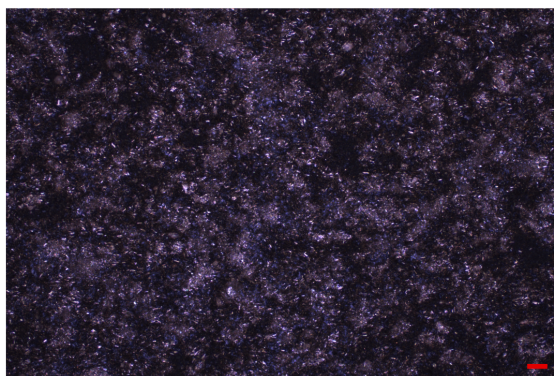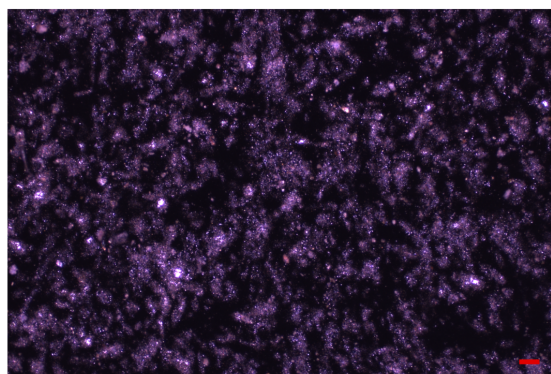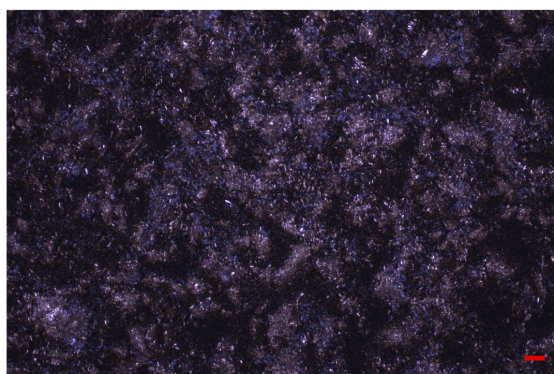
Nanojungle 20 cm impact
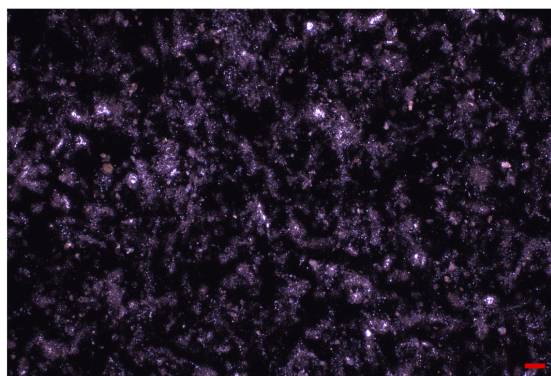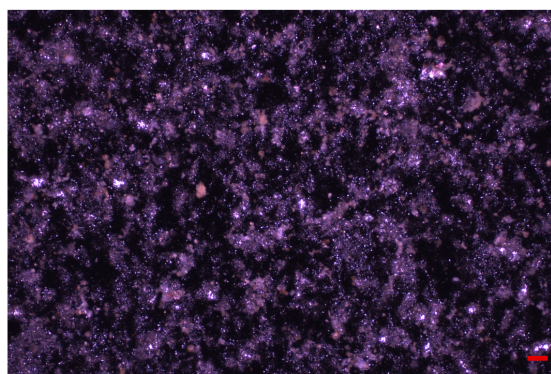
Nanograss 20 cm impact

Nanojungle 30 cm impact

Nanograss 30 cm impact

Nanojungle 30 cm impact

Nanograss 40 cm impact

Figure S2: Optical images of nanojungle and nanograss surfaces impacted by 10 g of sands from different heights. The scale bars are 100 μm.
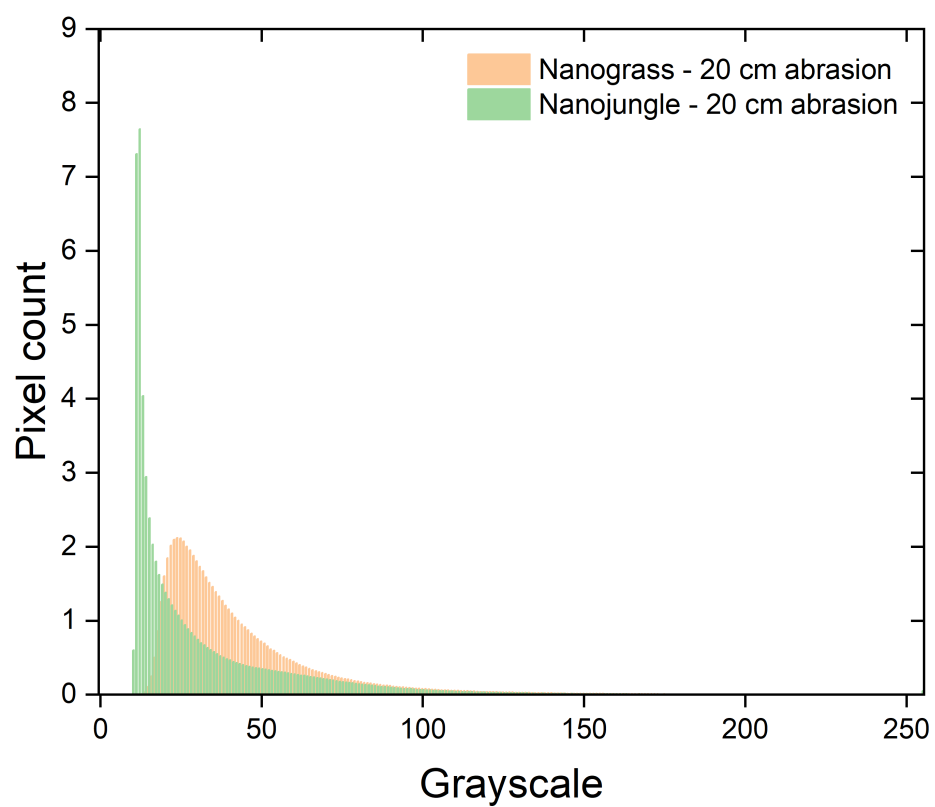
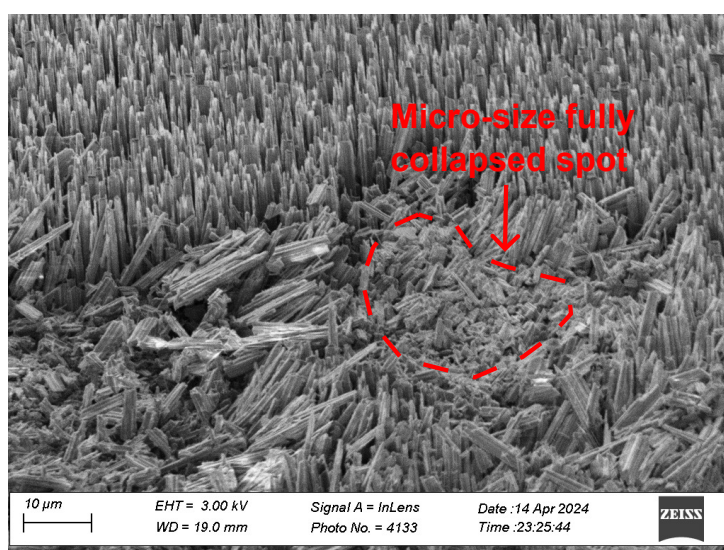Figure S3: Pixel grayscale histograms of nanograss and nanojungle surface after impact of 10 g of sands from 20 cm.
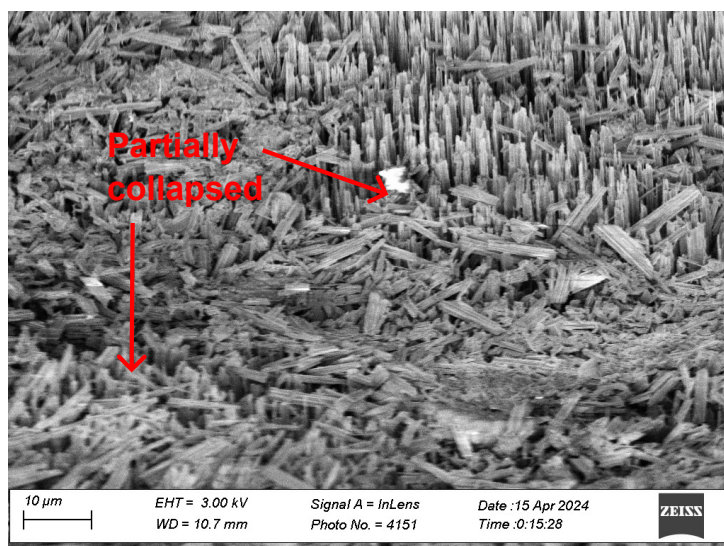
Figure S4: SEM micrographs examples of 'partially collapsed' spots and a 'micro-size fully collapsed' spot.
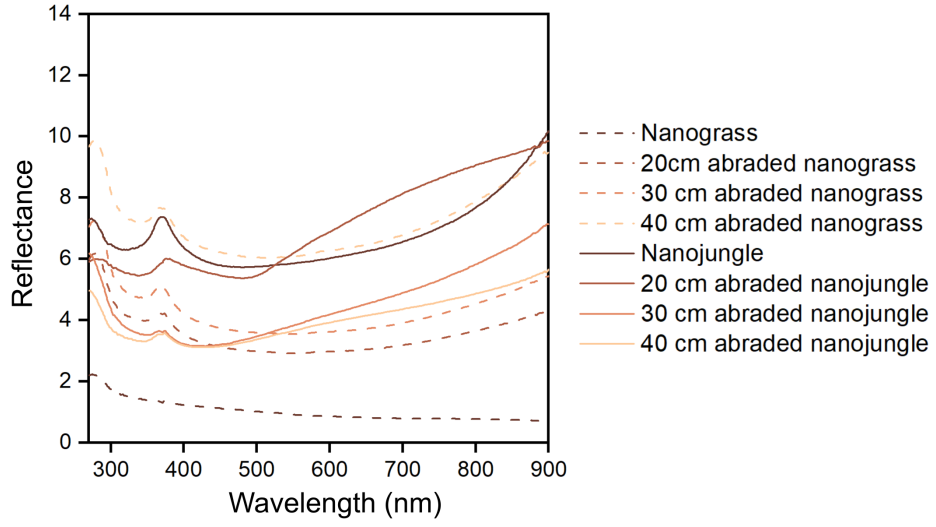
Figure S5: Reflectance spectra of nanograss and nanojungle b-Si surfaces after sand impact (10 g) from different heights.
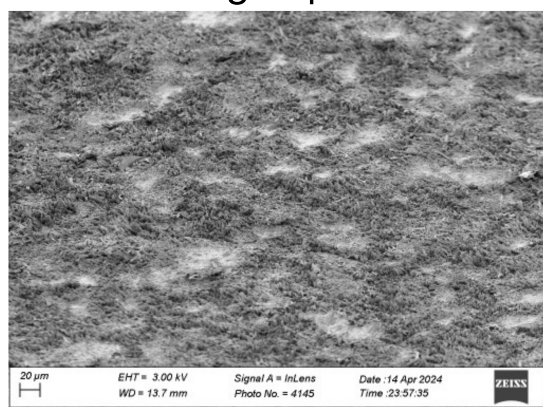
The results were averaged from three sets of measurements. Reflectance was calculated using the following equation:
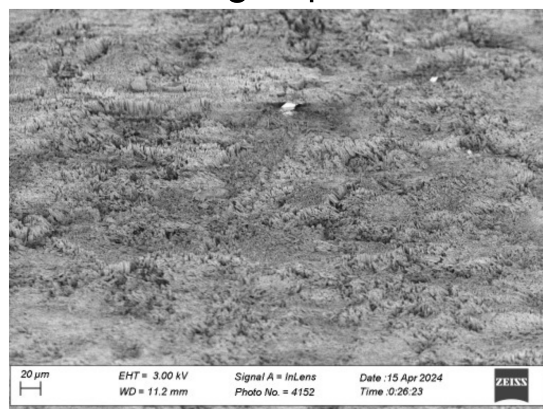
$$Reflectance(\%) = (R_2/R_1) * 100 \qquad (S1)$$

where R_1 represents the reflectance measured with a reference (white background) and R_2 denotes the reflectance measured in the presence of the sample.
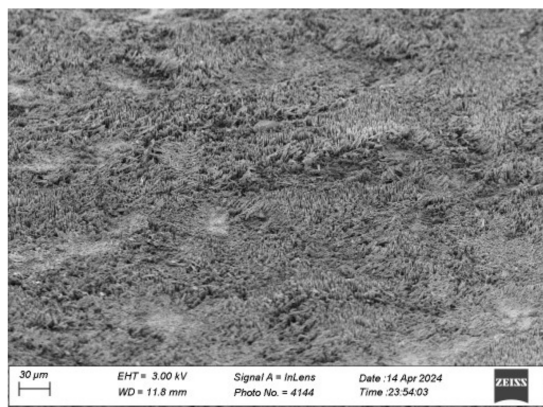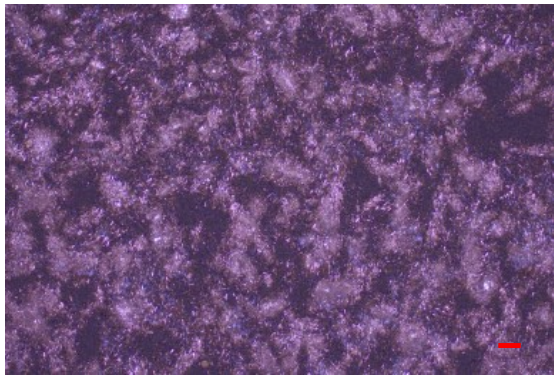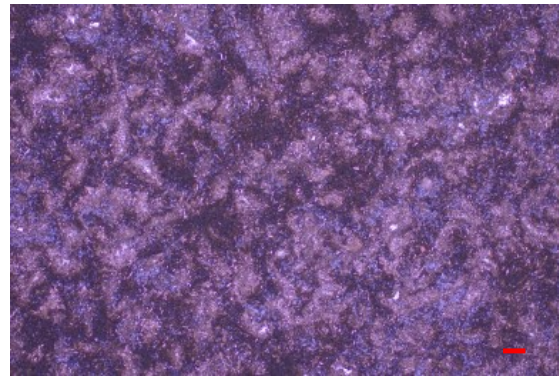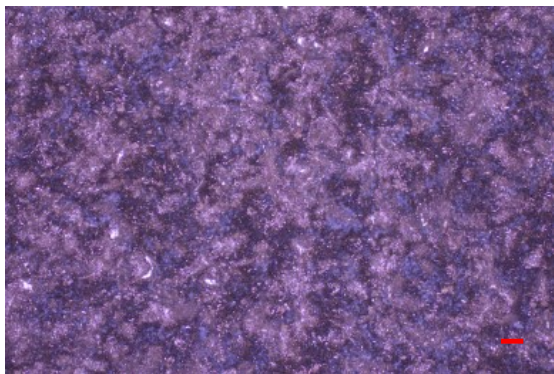
20 g impact

40 g impact

60 g impact

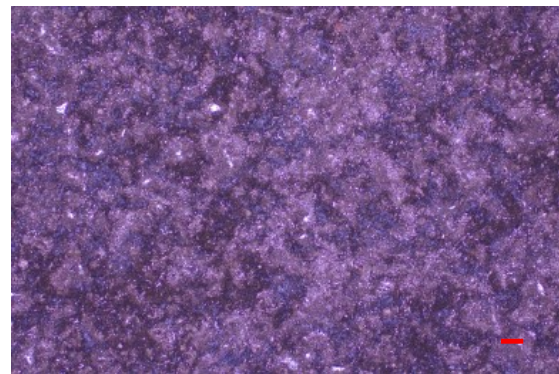Figure S6: SEM micrographs of impacted nanojungle surfaces with different weights of sands.
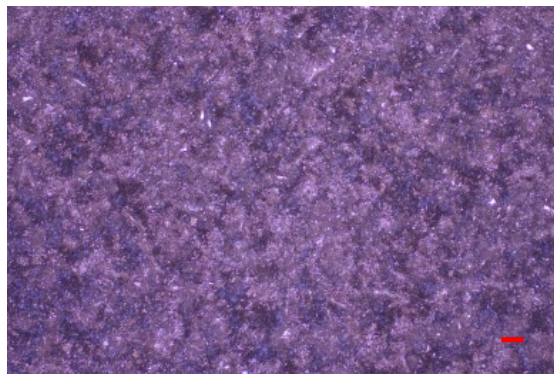
15 g impact

20 g impact

30 g impact

40 g impact

60 g impact

Figure S7: Optical images of impacted nanojungle surfaces with different weights of sands. The scale bars are 100 μm.
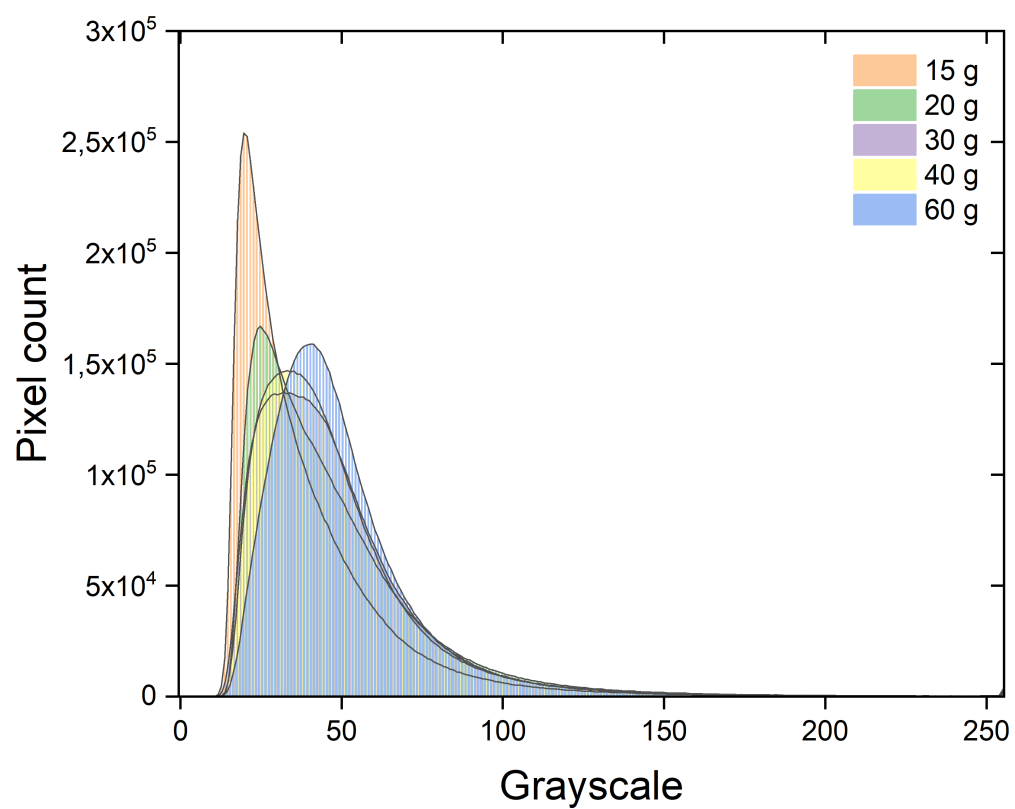
Figure S8: Pixel grayscale histogram of impacted nanojungle surfaces with different weights of sands.