Supplementary information

Enhancing light trapping of macroporous silicon by alkaline etching: application for the fabrication of black Si nanospike arrays

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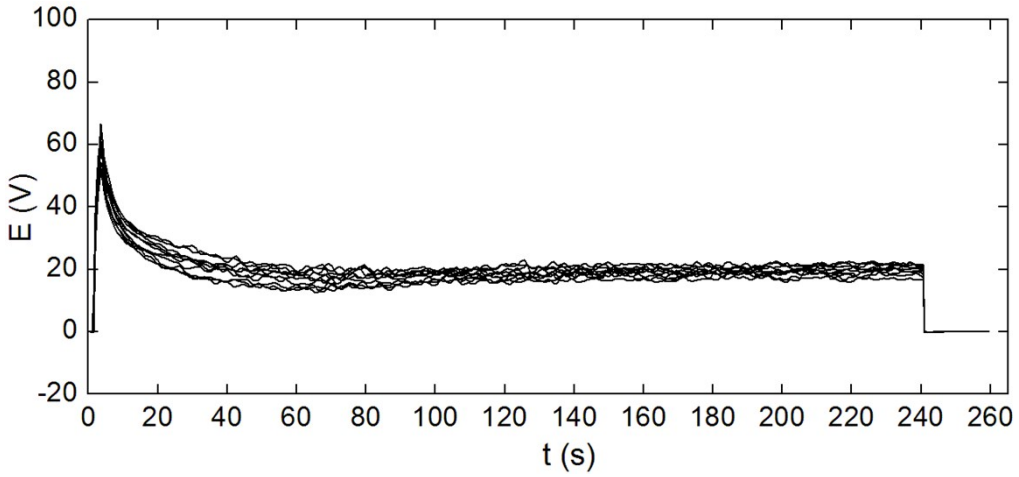

Figure S1. Potential-time curves obtained for 10 *n*-Si surfaces etched by PEE galvanostatically in HF/EtOH. The applied current was 100 mA, the surface area was 0.785 cm² and the illumination power was 100 mW cm^{-2}.

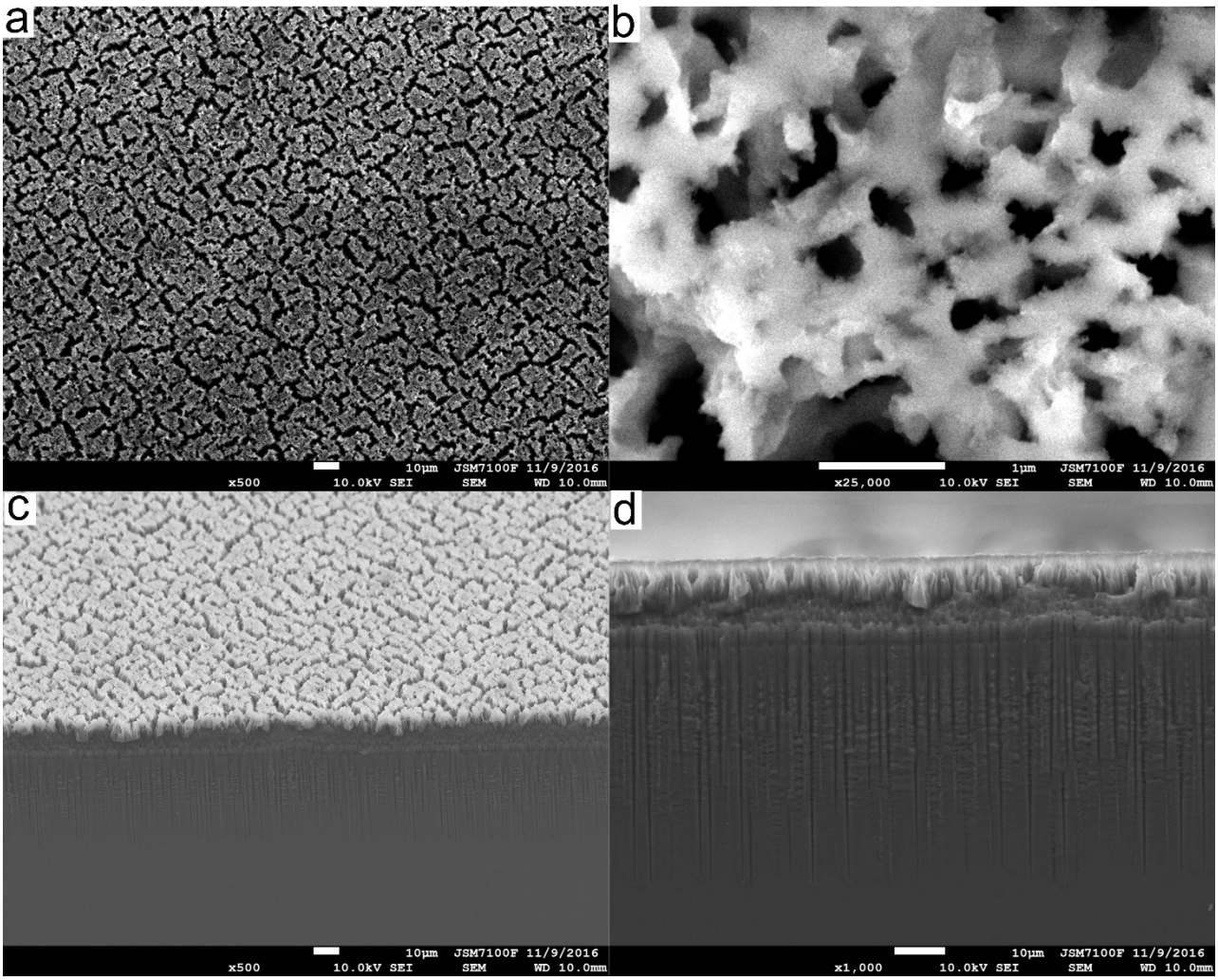

Figure S2. SEM images showing different views of the porous Si layer obtained after PEE. a) Low magnification top view. b) High magnification top view. c) Low magnification titled view. d) Cross-section.

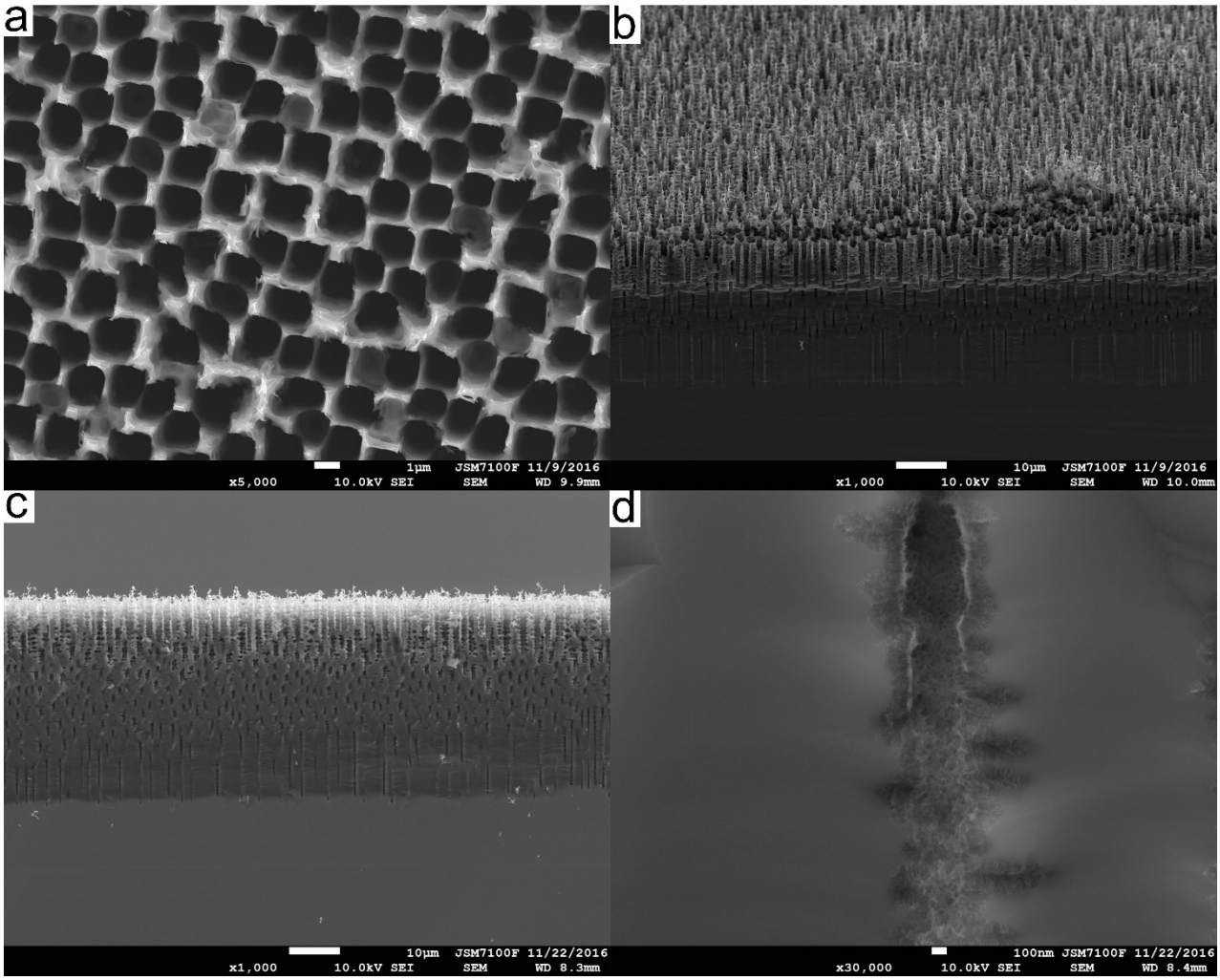

Figure S3. SEM images showing different views of the porous Si layer obtained after an AE time of 2 s. a) Top view. b) Tilted view. c) Cross-section. d) High magnification cross-section.

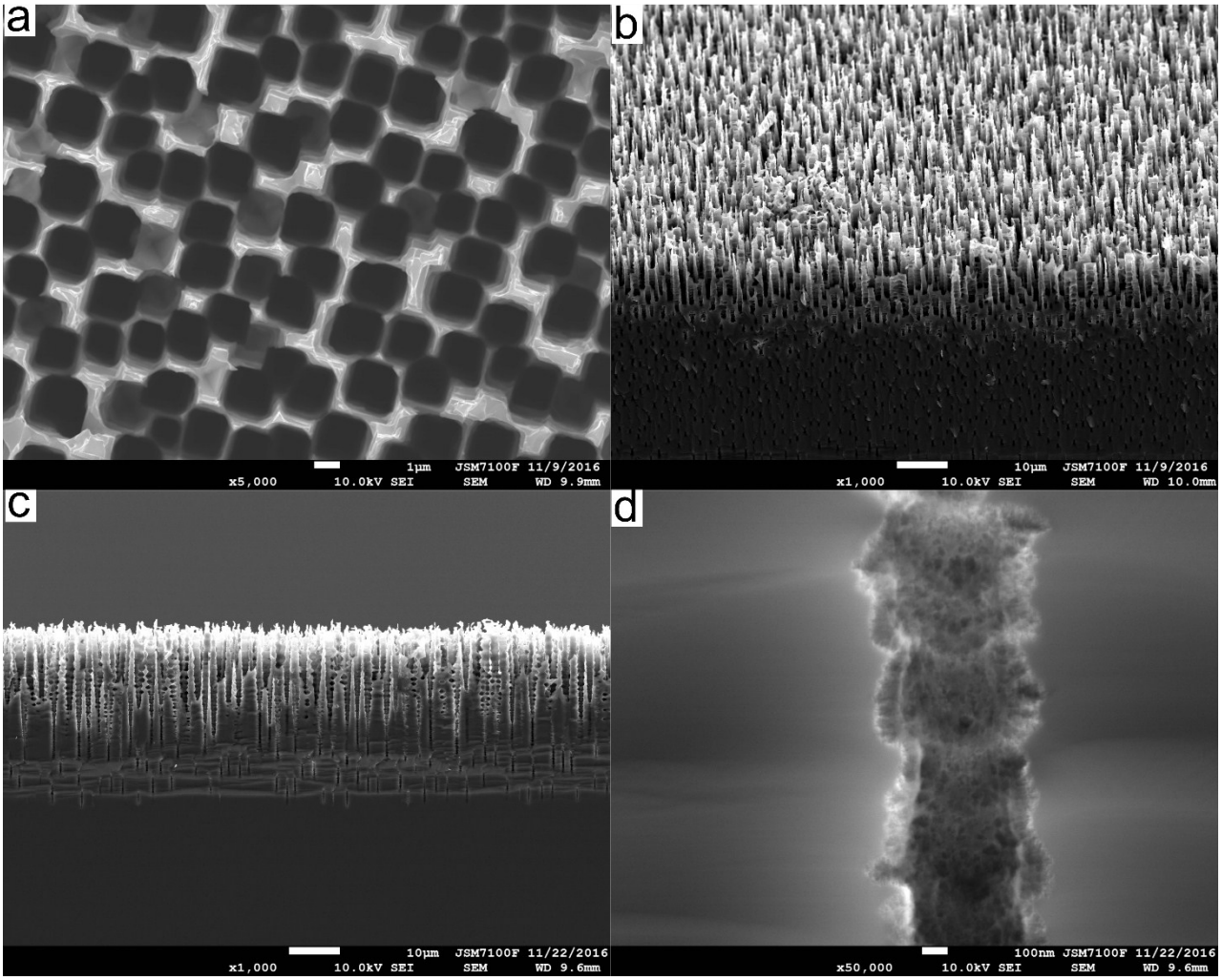

Figure S4. SEM images showing different views of the porous Si layer obtained after an AE time of 15 s. a) Top view. b) Tilted view. c) Cross-section. d) High magnification cross-section.

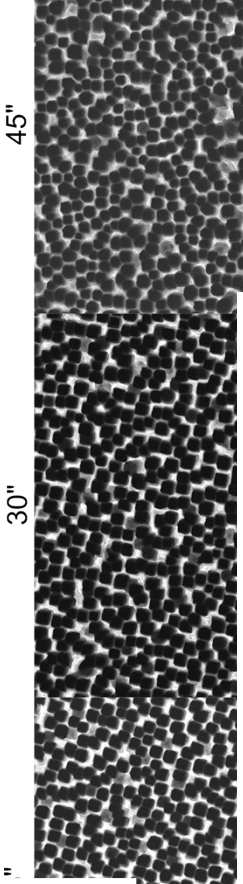

Figure S5. SEM images (top row) and corresponding images obtained by the freeware ImageJ (bottom row), that were used for the statistical analyses of the average pore diameter presented in Figure S6.

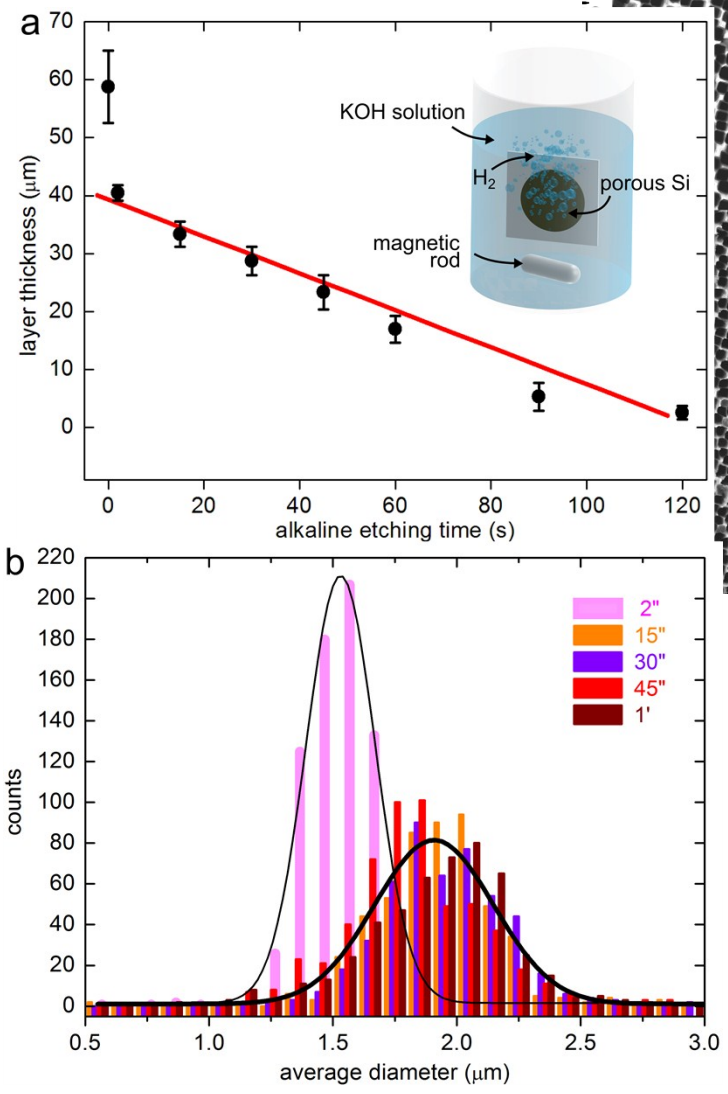

Figure S6. Evolution of the structural parameters as a function of AE time. a) Curves showing the evolution of the porous layer thickness as a function of the AE time (black dots are experimental measurements and the red line is a linear fit of the experimental data without the first point). Inset: Scheme of the setup used for the AE. b) Distributions of the top diameter of the pores as a function of the AE time (See Figure S5 for the top view SEM images used for pore statistics).

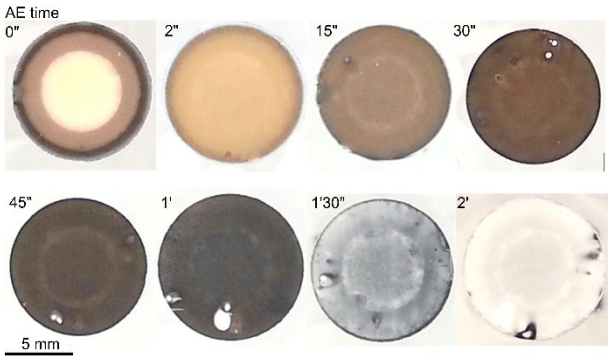

Figure S7. Photographs showing the evolution of the Si surface appearance as a function the time of AE.

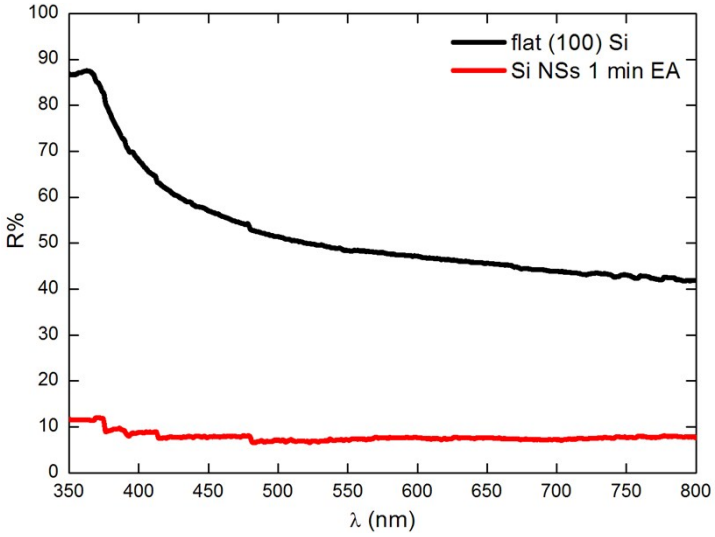

Figure S8. Reflectance spectra in the visible range for a planar (100) Si surface and a Si NSpikes surface prepared with an AE time of 1 min. These measurements have been performed with an optical measurement equipment different from that used to obtain spectra shown in Figure 4. Specifically, here a Cary 100 (Varian) spectrophotometer was used, equipped with an integrating sphere (DRA-CA-301, Labsphere) and referenced with a spectralon standard (Labsphere). With this setup, the reflectance decrease was 85 %.

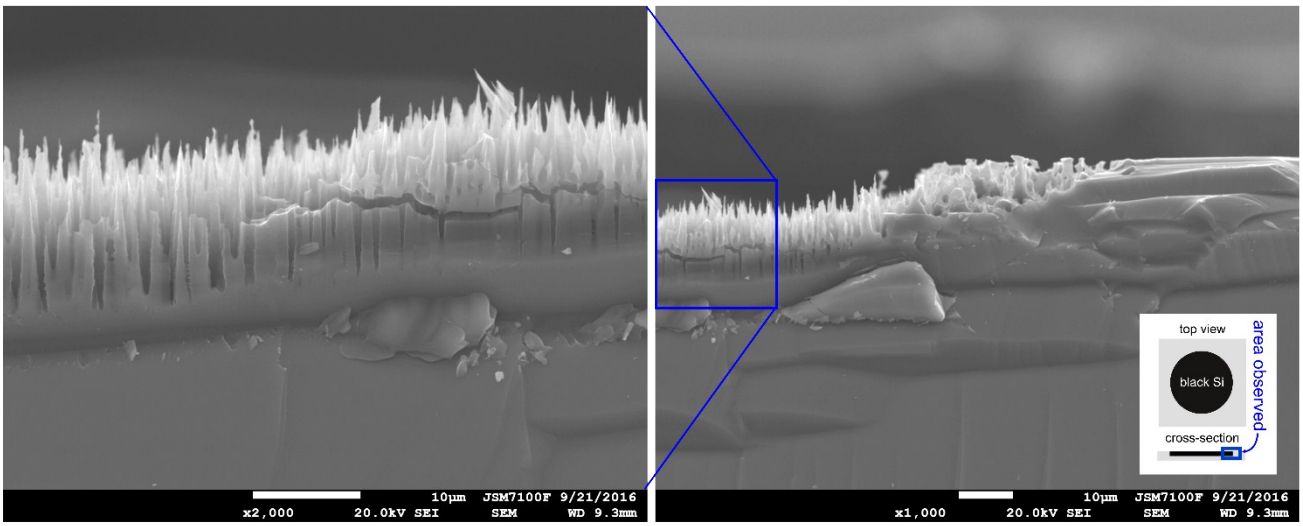

Figure S9. SEM images showing the boundary of a black Si NSpike sample obtained for an AE time of 1 min. Inset: schematic representation of the area where these images were obtained.

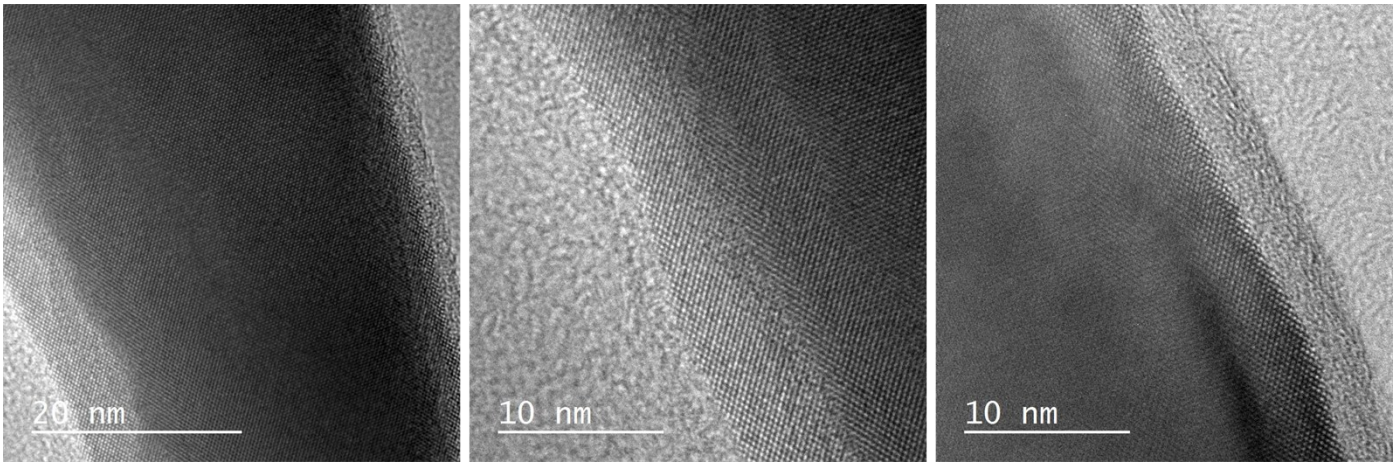

Figure S10. HR-TEM images obtained on individual Si NSpikes.

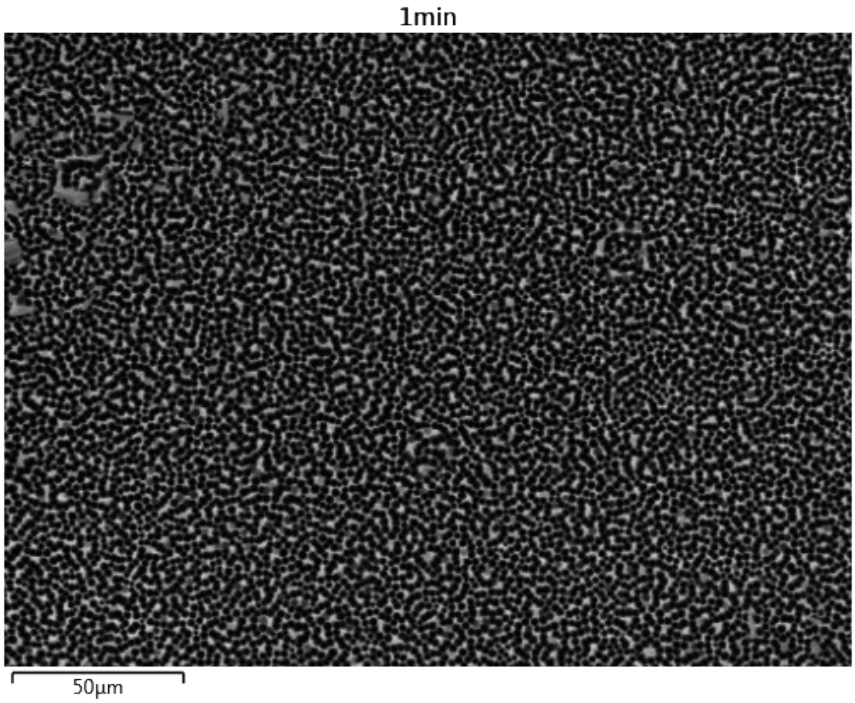

Figure S11. SEM image of the area where the EDS shown in Figure 4f was performed.

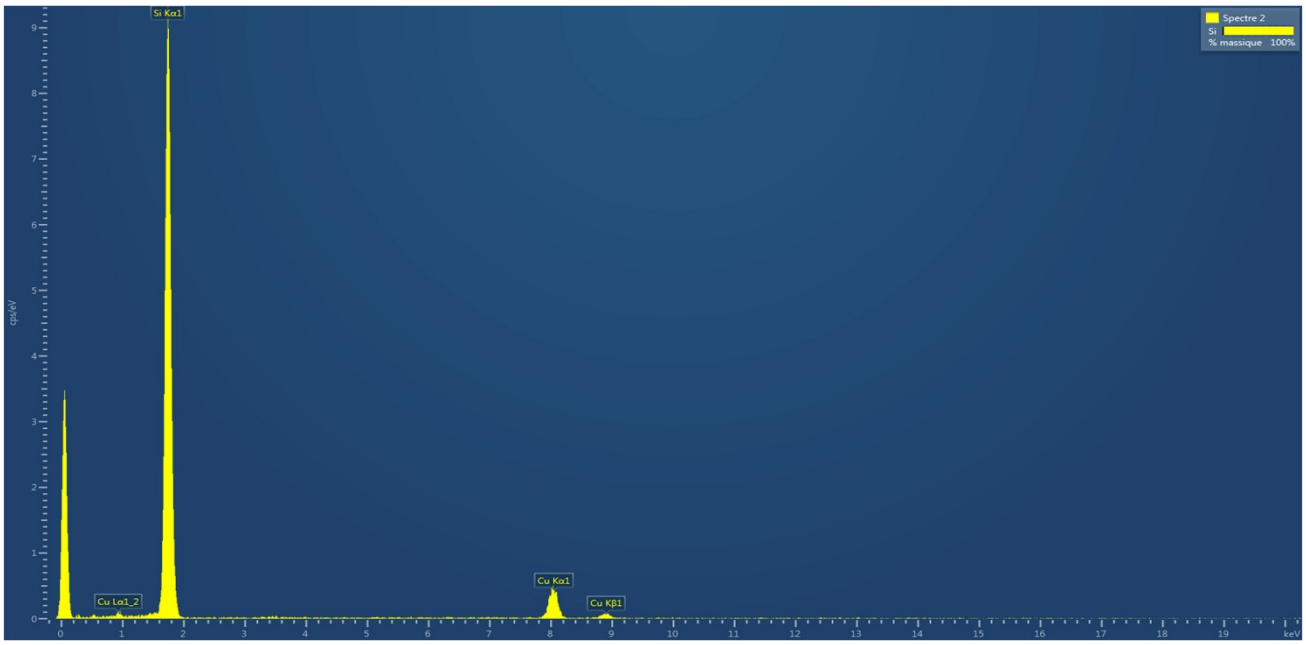

Figure S12. EDS analysis performed on the single Si NSpike shown in Figure 4d (note that the copper signal originates from the TEM grid).