Supplementary Material

To

Analysis on Discharge Behavior and Performance of As- and B-doped Silicon Anodes in Non-Aqueous Si–Air Batteries under Pulsed Discharge Operation

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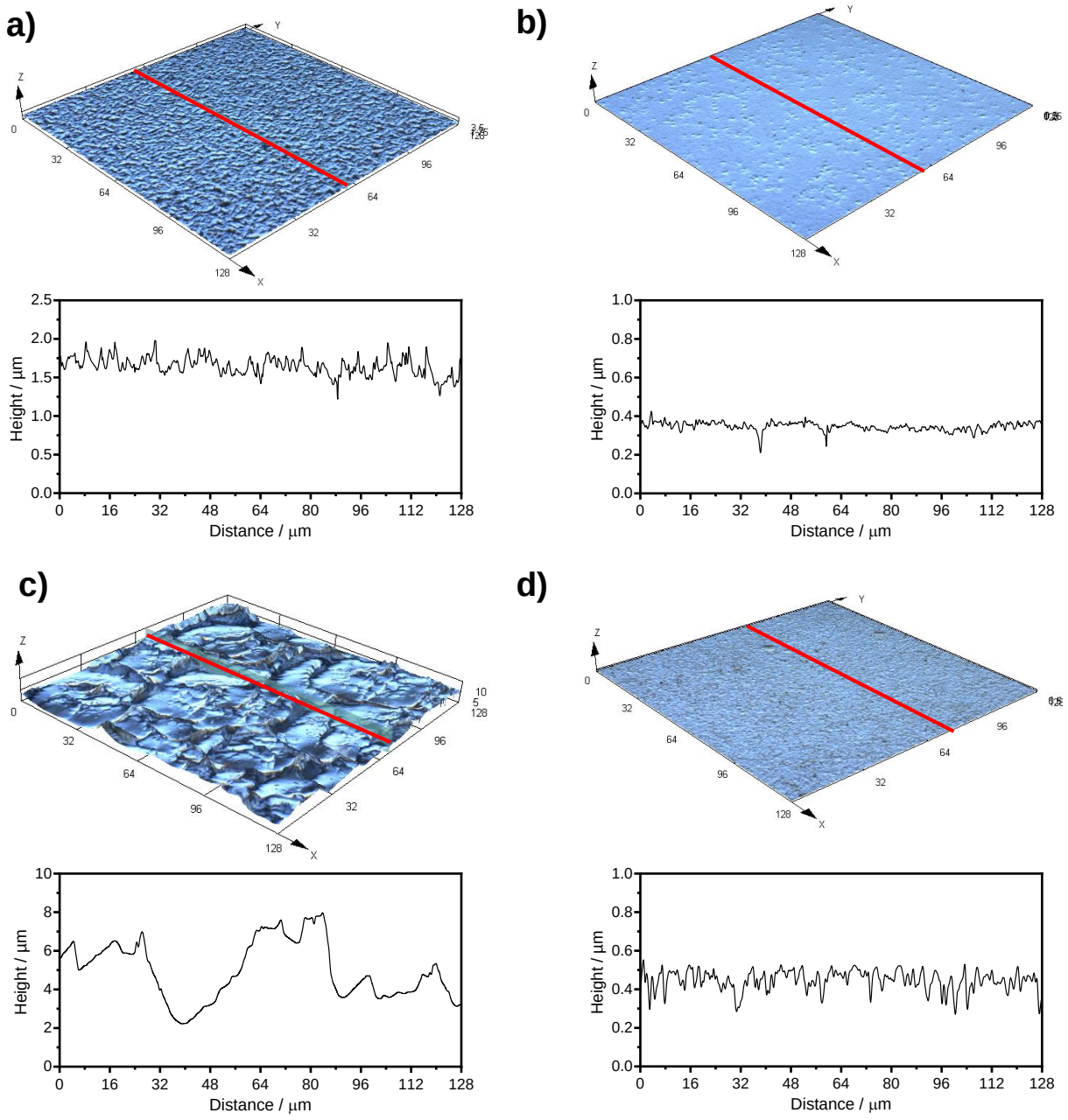

Figure S1: Surface profiles and line roughness analysis of Si electrodes from Figure 7. a) As-doped Si electrode with p=0, b) B-doped Si electrode with p=0, c) As-doped Si electrode with p=0.875, d) a) B-doped Si electrode with p=0.875. The red lines indicate the line profiles for the roughness analysis. The images were recorded by Confocal Laser Scanning Microscope (OLS4100, Olympus Corp., Japan) and analyzed by LEXT software.

Figure S1 illustrates the surface micrographs of As- and B-doped Si electrodes after operation of 200 h with OCV (p=0) and pulsed discharge (p=0.875) by 0.3 mA cm^{-2}. The height profiles along the lines indicated by red color on the surface micrographs are also shown below each corresponding surface. Considering the images and analysis of the roughness values given in Table S1, As-doped Si electrodes exhibit a surface roughness of 0.114 µm for OCV (p=0), which is increased significantly to 1.035 µm under pulsed discharge with p=0.875. B-doped Si electrodes, on the other hand, show a surface roughness of 0.023 µm and 0.036 µm under pulsed conditions of p=0 and p=0.875, respectively. Hence, the analysis of the roughness parameter proves that the As-doped Si electrodes indicate rougher surface characteristics than B-doped Si electrodes under both OCV and pulsed conditions.

Table S1: The analysis of line roughness and area (surface) roughness parameters from Figure S1. The analysis was obtained by LEXT Software (Olympus).

Electrode	p	Line Roughness / µm		Area (Surface) Roughness / µm	
		Ra (ISO4287)	Rz (ISO4287)	Sa	Sz
As-doped Si	0	0.084	0.564	0.114	3.267
As-doped Si	0.875	1.203	2.335	1.035	9.016
B-doped Si	0	0.015	0.121	0.023	0.710
B-doped Si	0.875	0.040	0.239	0.036	0.534

Line Roughness – Ra: Arithmetical mean height, Rz: Maximum height profile

Area (Surface) Roughness – Sa: Arithmetical mean height, Sz: Maximum height profile