Electronic Supplementary Information for

Ordered Array of Tilted Silicon Nanobelts with Enhanced Solar Hydrogen Evolution Performance

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Supplementary figures:

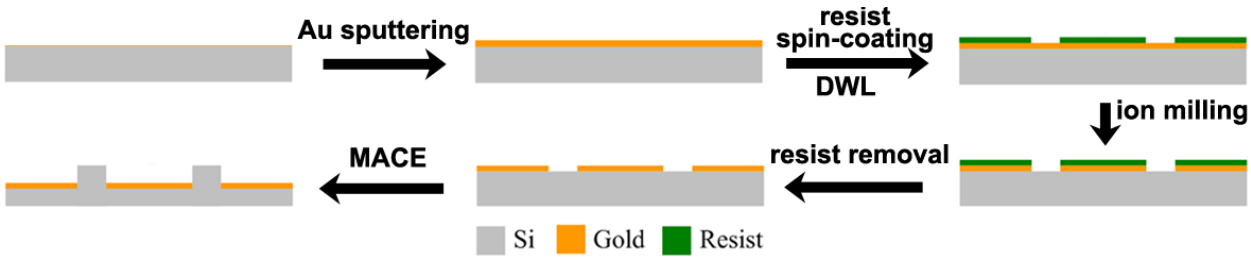

Fig. S1 Fabrication procedure of the Si NB arrays.

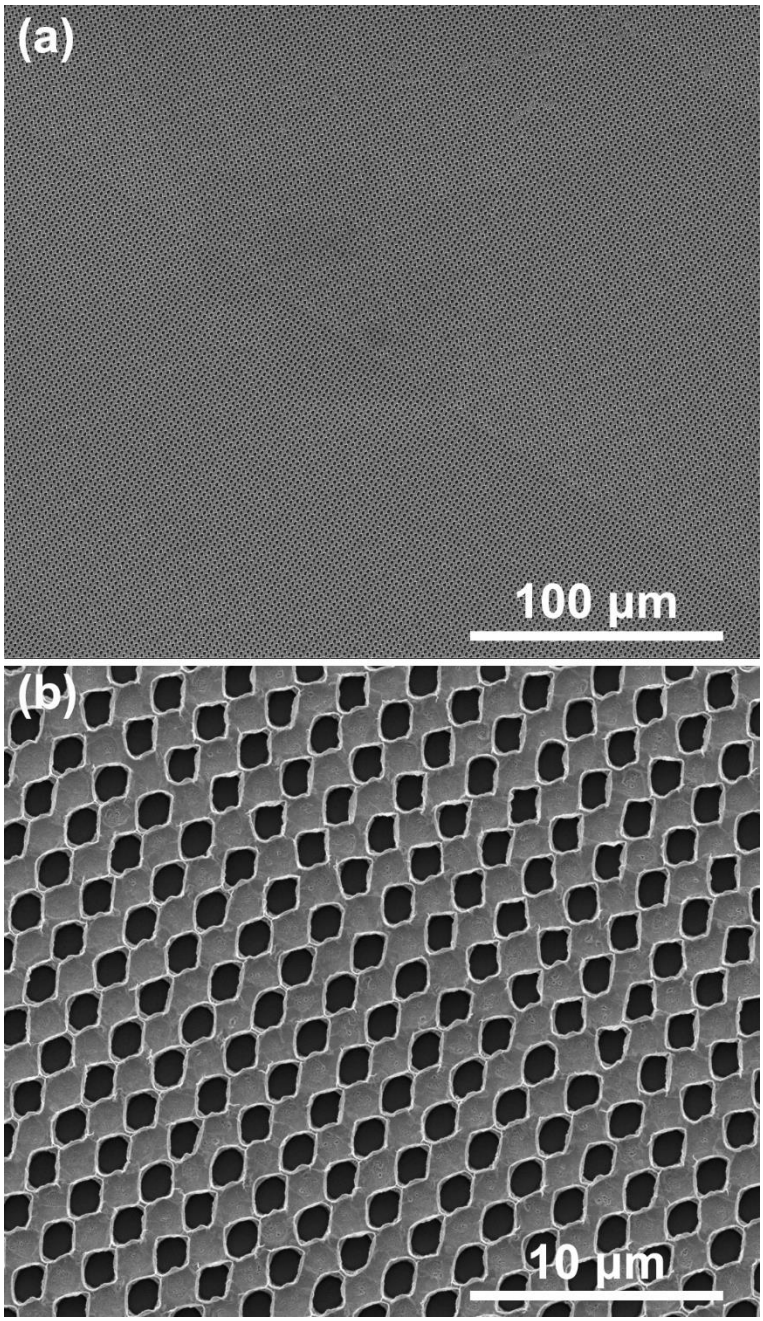

Fig. S2 SEM micrograph of the Si substrate patterned with a 100 nm thick gold mesh formed by direct write laser (DWL) lithography followed by ion milling. (a) Overview and (b) Zoomed view. Since the hole diameter and inter-hole distance approach the spatial resolution of our DWL facility, the originally designed circular holes were found to become irregular after exposure. This irregularity was transferred to the gold layer through ion milling.

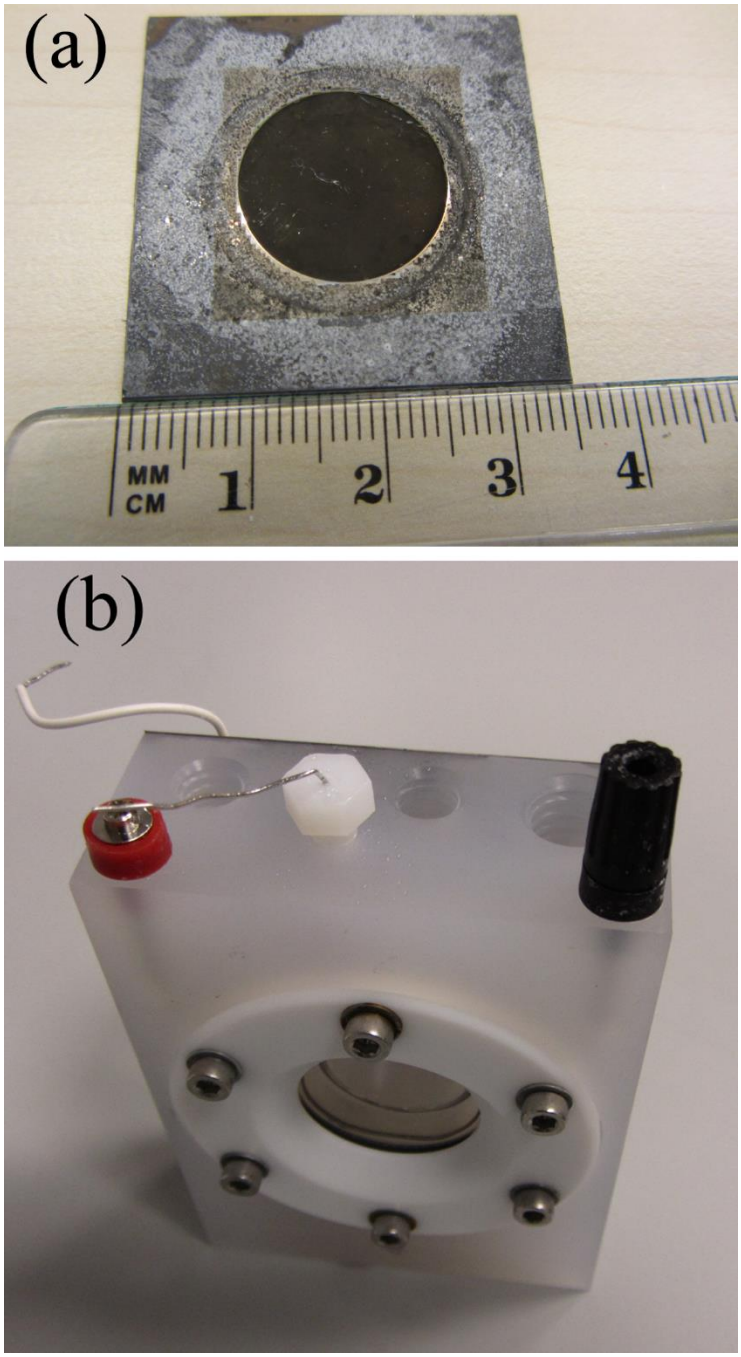

Fig. S3 (a) Digital photograph of the Si nanobelt array photoelectrode. The active area is 2.5 cm^2. (b) Digital photograph of the electrochemical cell (PECC2, Zahner) used for the photoelectrochemical tests.

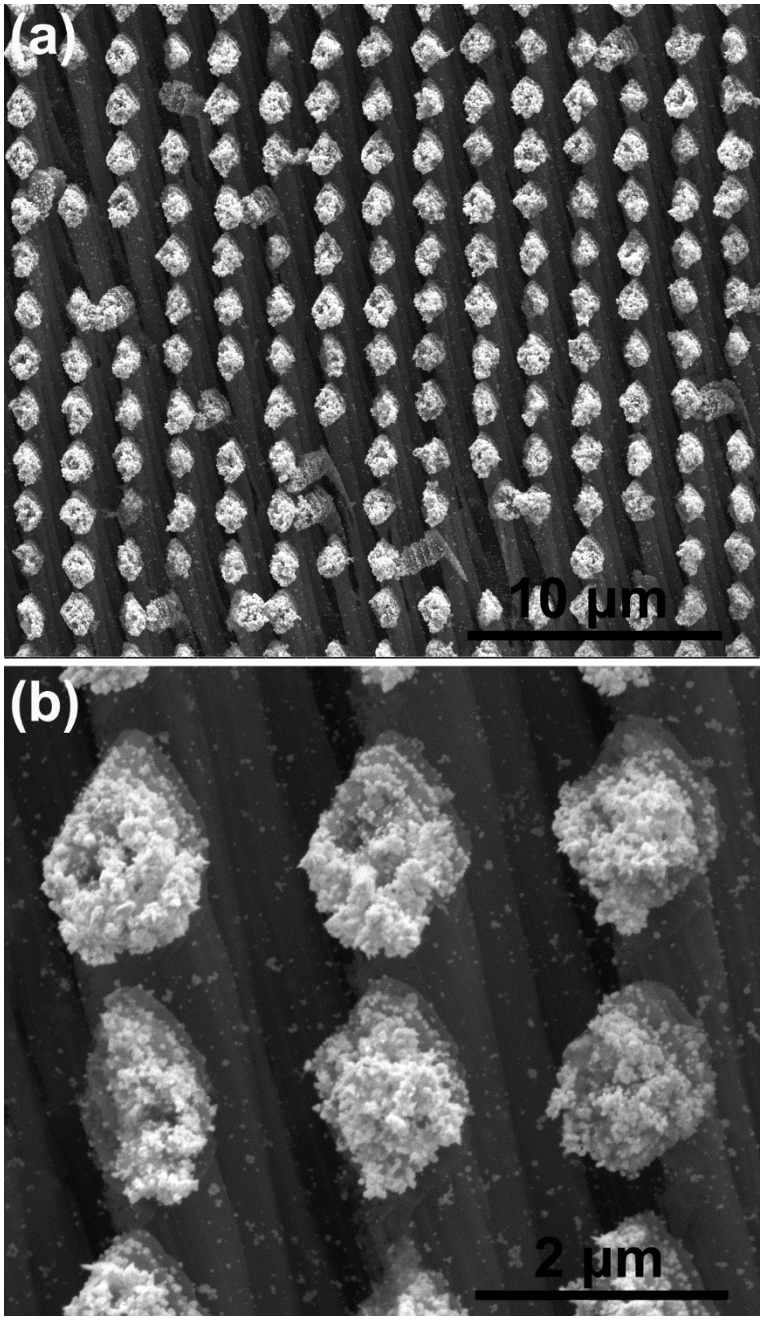

Fig. S4 SEM micrographs showing the morphology of Pt nanoparticle decorated Si nanobelt arrays. (a) Overview and (b) Zoomed view. Pt nanoparticles were mostly deposited on the top part of the arrays, consistent with the previous reports.

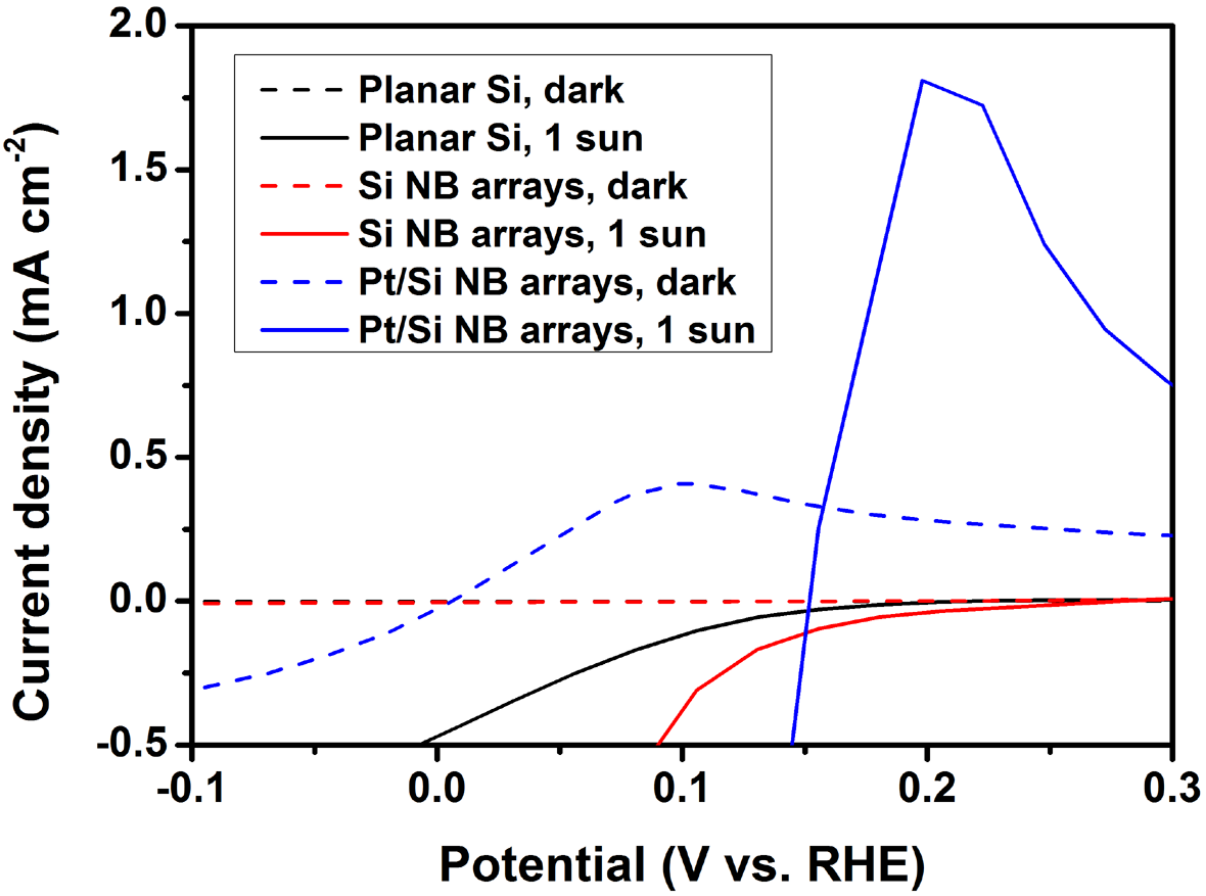

Fig. S5 Zoomed view of the J-V plots of the planar Si, Si NB and Pt/Si NB array electrodes measured in dark and simulated one sun conditions. The anodic peak at the Pt/Si NB array electrode may arise from the desorption of the evolved H_2 gas from the Pt nanoparticle surface.

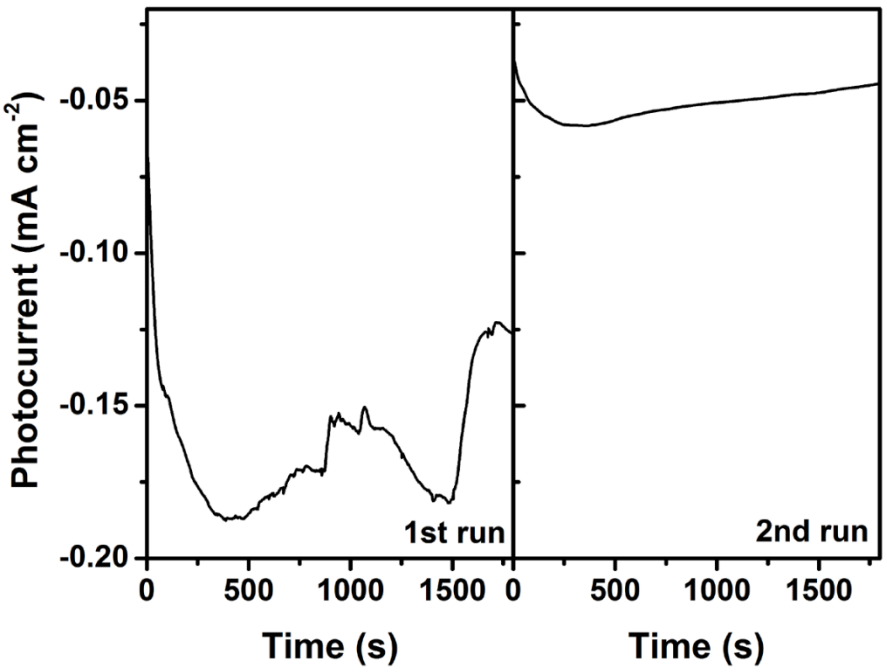

Fig. S6 Zoomed view of the I-t plot of planar Si recorded under one sun conditions at 0 V vs. RHE.

Supplementary Tables:

Table S1. Equivalent series resistance* and charge transfer resistance of the Planar Si, Si NB array and Pt/Si NB array electrodes obtained from the equivalent circuit fitting.

	R_e (Ω)	$R_{ct(1)}$ (Ω)	CPE(1) (μF)	R_{ct2} (Ω)	CPE2 (μF)
Planar Si	1.9	138.1	7.9	–	–
Si NB arrays	2.2	4.8	50.5	–	–
Pt/Si NB arrays	2.2	2.1	177.4	0.5	46.2

*R_e includes the contribution from the inherent resistance of the electrode material, bulk electrolyte resistance and contact resistance at the electrode/electrolyte interface.