

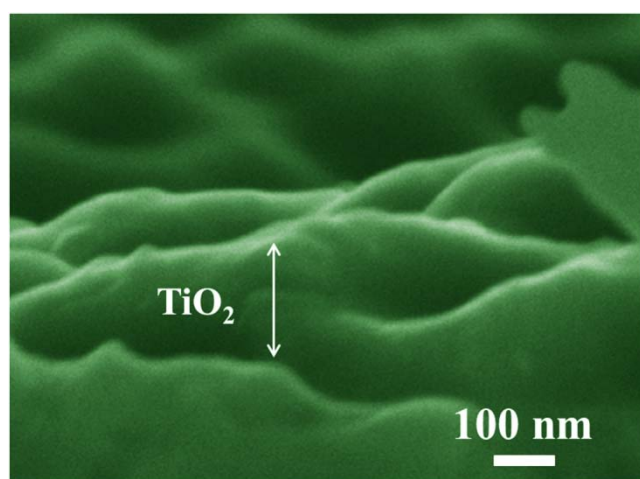
## Supporting Information

### Large scale, highly efficient and self-powered UV photodetectors enabled by all-solid-state $n$ -TiO<sub>2</sub> nanowells/ $p$ -NiO mesoporous nanosheets heterojunction

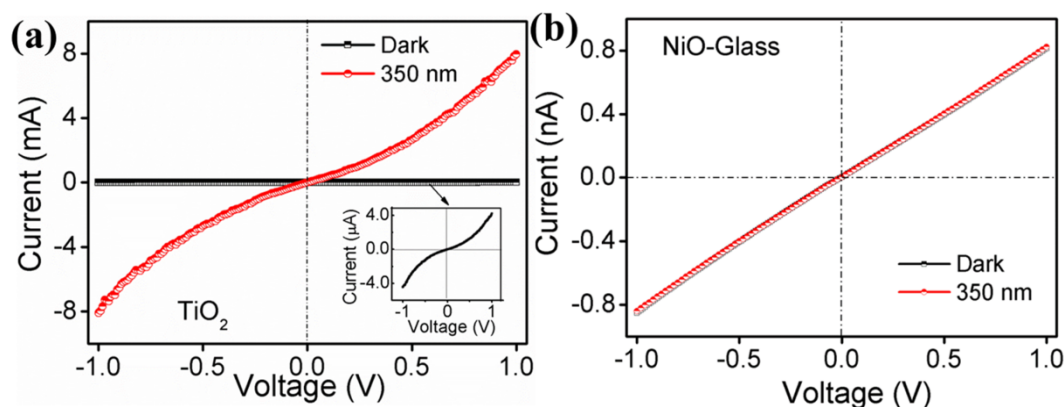
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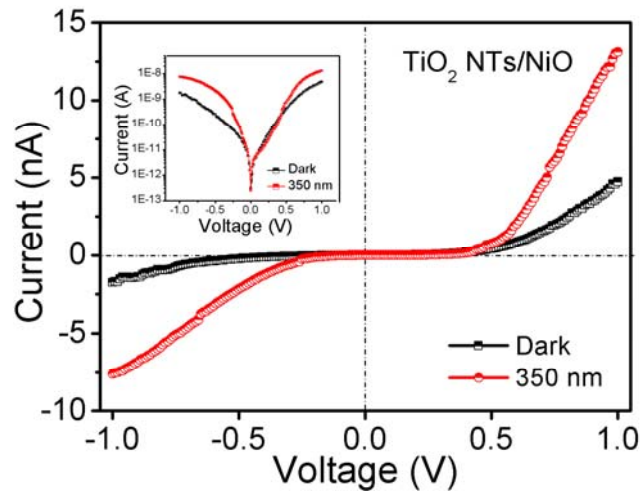
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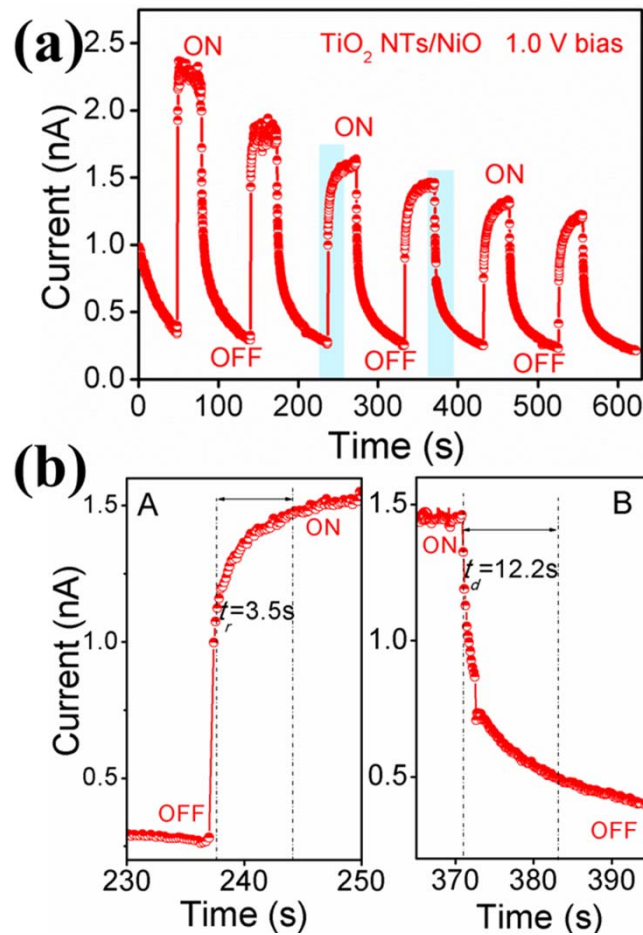
**Fig. S1** Cross-sectional SEM image of TiO<sub>2</sub> nanowells on a Ti metal substrate.



**Fig. S2** Typical  $I$ - $V$  curves for different photodetectors based on (a) TiO<sub>2</sub> nanowells, (b) pure NiO nanosheets. Inset in (a) shows the enlarged  $I$ - $V$  curve under dark condition.



**Fig. S3** *I-V* curves for conventional  $\text{TiO}_2$  nanotubes/NiO nanosheets hybrid photodetector. Inset shows the corresponding *I-V* curves in logarithmic coordinates.



**Fig. S4** (a) *I-t* curves during on-off switching tests at 1.0 V bias with 350 nm illumination for conventional  $\text{TiO}_2$  nanotubes/NiO nanosheets hybrid photodetector. (b) Enlarged portions of (A) 230-250 s range and (B) 365-395 s range corresponding to light-off to light-on and light-on to light-off transitions, respectively.