

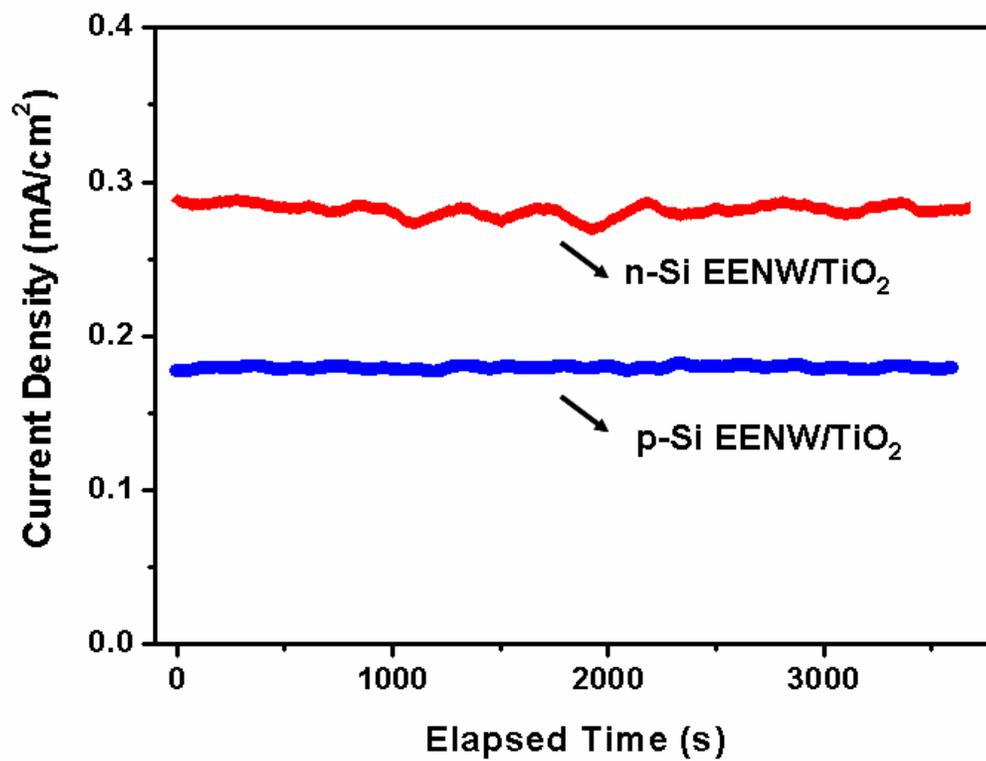
# High Density n-Si/n-TiO<sub>2</sub> Core/Shell Nanowire Arrays with Enhanced Photoactivity

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## SUPPORTING INFORMATION PARAGRAPH

### **Stability measurement: Photocurrent measurement versus elapsed time.**

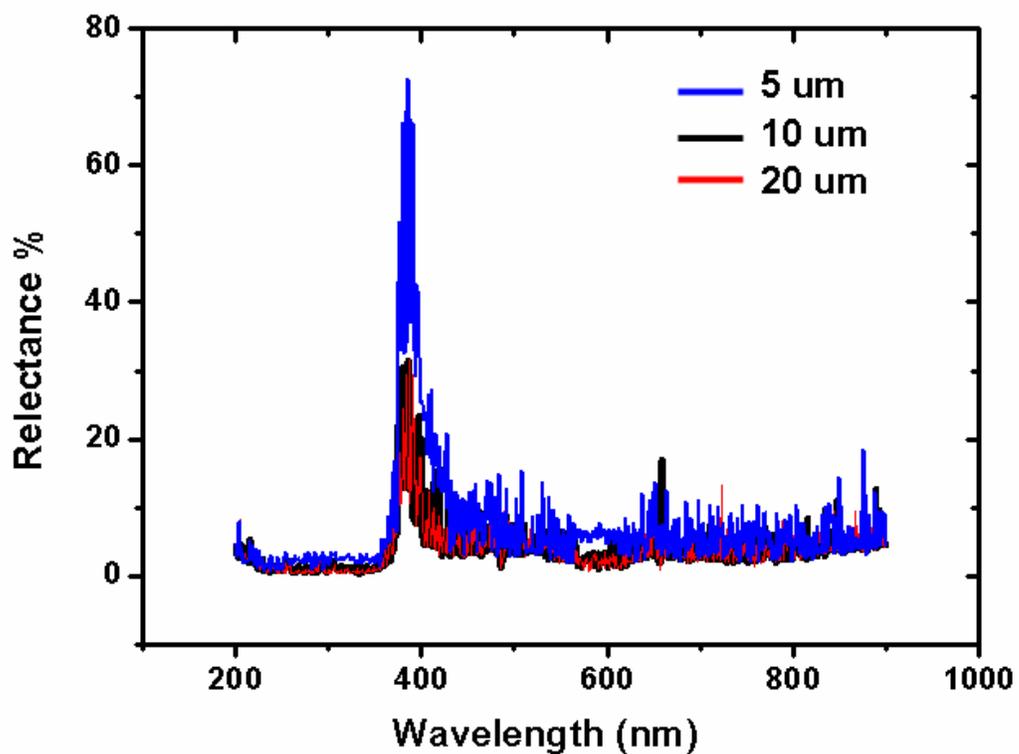
We tested the stability of the Si/TiO<sub>2</sub> photoanodes in 1M KOH which was the electrolyte in this study. We measured the photocurrent density versus elapsed time under the Xe lamp illumination (100 mW/cm<sup>2</sup>). Both of the n-Si/n-TiO<sub>2</sub> and p-Si/n-TiO<sub>2</sub> core/shell nanowire photoanodes show stable photocurrent density at zero bias voltage (Figure S1).



**Figure S1.** Photocurrent density versus elapsed time for n-Si EENW/TiO<sub>2</sub> and p-Si EENW/TiO<sub>2</sub> core/shell nanowire arrays. Both of the samples have stable photocurrent for an hour in 1M KOH electrolyte in which Si EENW dissolution takes place vigorously.

### **Reflectance measurement of Si/TiO<sub>2</sub> nanowire arrays**

The reflectance of the Si/TiO<sub>2</sub> core/shell nanowire arrays with various lengths were measured in the range of 200~900 nm. We prepared 5 μm, 10 μm, and 20 μm long Si nanowire arrays and Si planar wafer, and deposited ALD TiO<sub>2</sub> of same thickness (average 35 nm) on each sample. The reflectance of the Si planar/TiO<sub>2</sub> structure was taken as background. All of the three different lengths of nanowire arrays show lower reflectance than the planar sample. For example, in the range of 200~350nm, nanowire arrays only have less than 2% reflectance compared to the planar sample. In the range of 450~900nm, the nanowire arrays suppress the reflectance down to 5%. In the range of 350~450 nm, the reflectance varies from 35~70% due to the light absorption in shell TiO<sub>2</sub>. 5 μm long Si/TiO<sub>2</sub> nanowire arrays have higher reflectance than 10 μm and 20 μm long nanowire arrays.



**Figure S2.** Reflectance (%) versus wavelength for the three different length of n-Si EENW/TiO<sub>2</sub> in the range of 200 ~ 900 nm when blank is n-Si planar/TiO<sub>2</sub> sample. Less than 5 % reflectance for all three n-Si EENW/TiO<sub>2</sub> samples except near the TiO<sub>2</sub> band gap (~380 nm). 5 μm ~ 20 μm long Si EENW/TiO<sub>2</sub> arrays have almost same reflectance which means the reflectance does not vary much depending on the nanowire length except near 380 nm.