Supporting Information for

Black Nanostructured Nb$_2$O$_5$ with Improved Solar Absorption and Enhanced Photoelectrochemical Water Splitting

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**Figure S1.** Photographs of NNCs and B-NNCs powder.

**Figure S2.** TEM and HR-TEM image of B-NNCs.

**Figure S3.** Tauc plots of two samples.
Figure S4. Normalized XPS O 1s spectra of NNCs and B-NNCs.

Figure S5. XPS survey spectrum of B-NNCs.

Figure S6. Chopped linear sweep voltammograms of NNCs and B-NNCs under simulated solar light illumination.
Figure S7. Schematic energy diagram of NNCs and B-NNCs.

Figure S8. 2-electrode photocurrent-potential curves and the corresponding ABPE.

Figure S9. The integrated photocurrent based on the IPCE data (300 nm to 600 nm). The photocurrent density was calculated by integrating the IPCE spectra with a standard AM 1.5 G solar spectrum (ASTMG-173-03), using the following equation:

\[
I = \int_{300}^{600} \frac{1}{1240} \lambda \text{IPCE}(\lambda) E(\lambda) d\lambda
\]

where \( E(\lambda) \) is the solar spectral irradiance at a specific wavelength \( \lambda \) and IPCE(\( \lambda \)) is the obtained IPCE profile as a function of wavelength \( \lambda \) at 0.23 V vs. Ag/AgCl (in 1 M HCl).
M NaOH). The calculated photocurrents (300–600 nm) are 0.838 mA cm$^{-2}$ and 0.091 mA cm$^{-2}$ for B-NNCs and NNCs, respectively.