Supporting Information

Photothermal Conversion Assisted Photocatalytic Hydrogen Evolution from Amorphous Carbon Nitrogen Nanosheets with Nitrogen Vacancies

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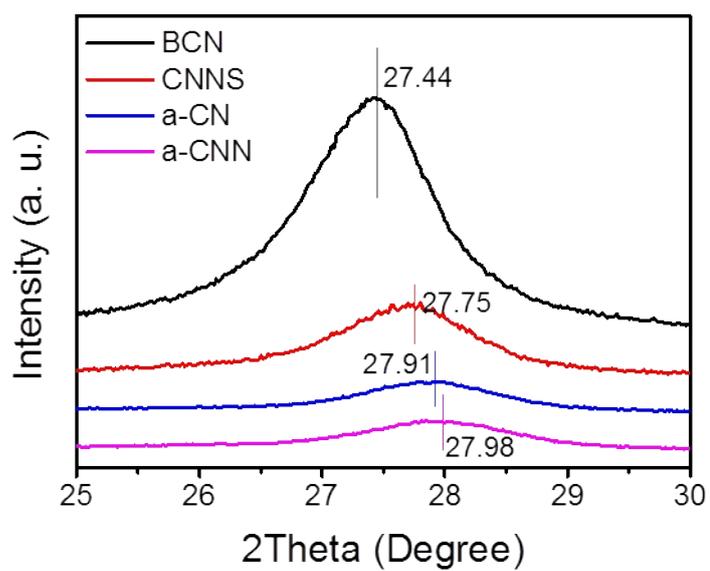
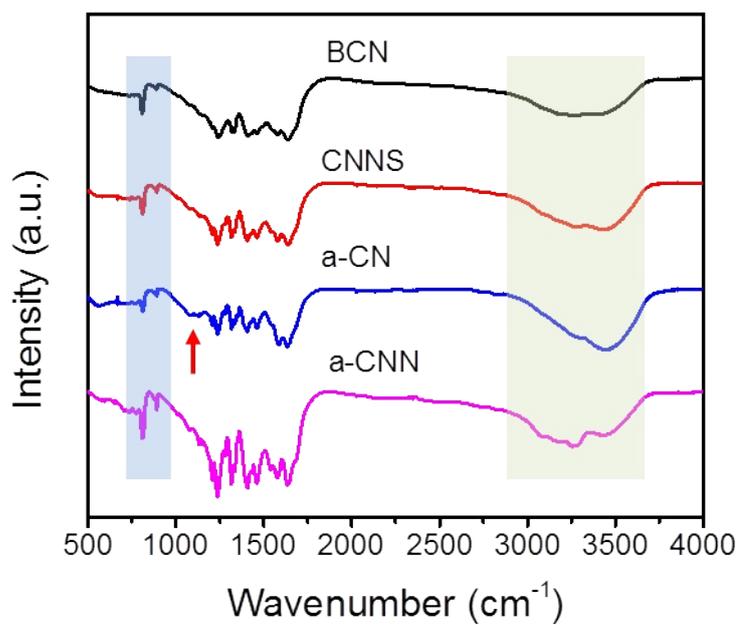*Corresponding author: stsygw@mail.sysu.edu.cn

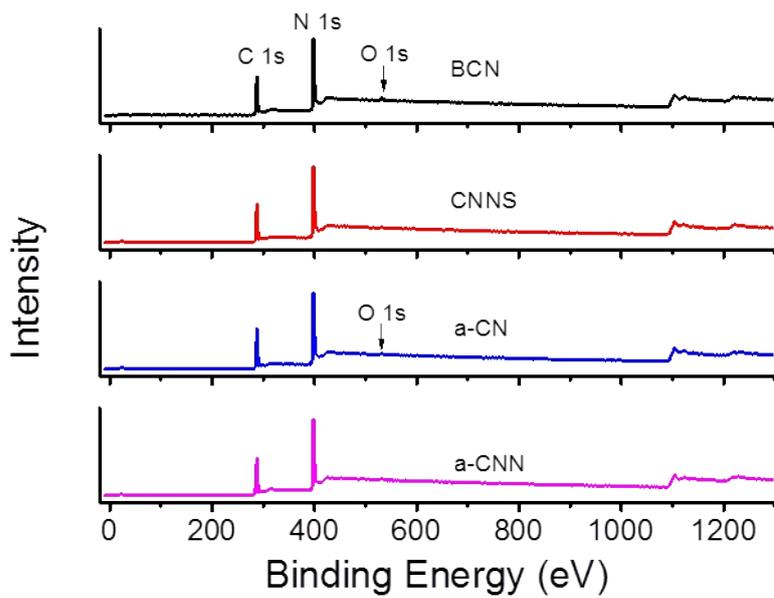**Figure S1** The digital photographs of different samples. (a) BCN, (b) CNNS, (c) a-CN and (d) a-CNN.
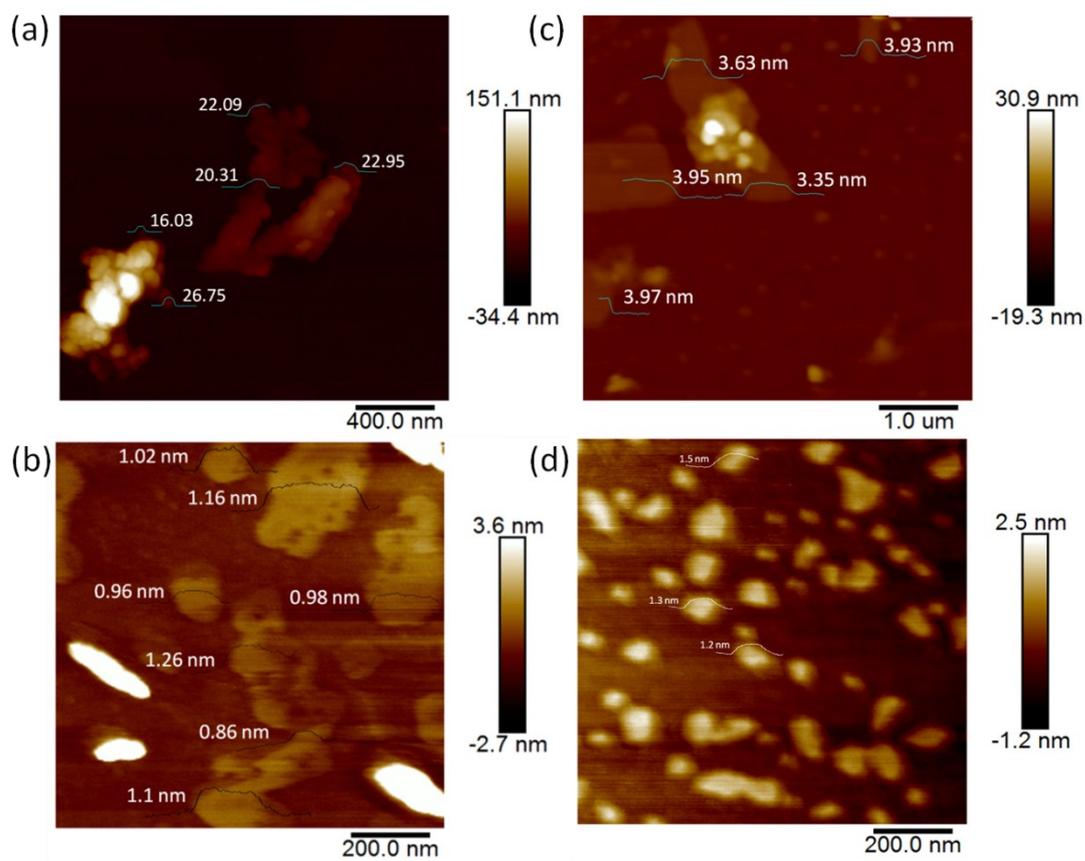
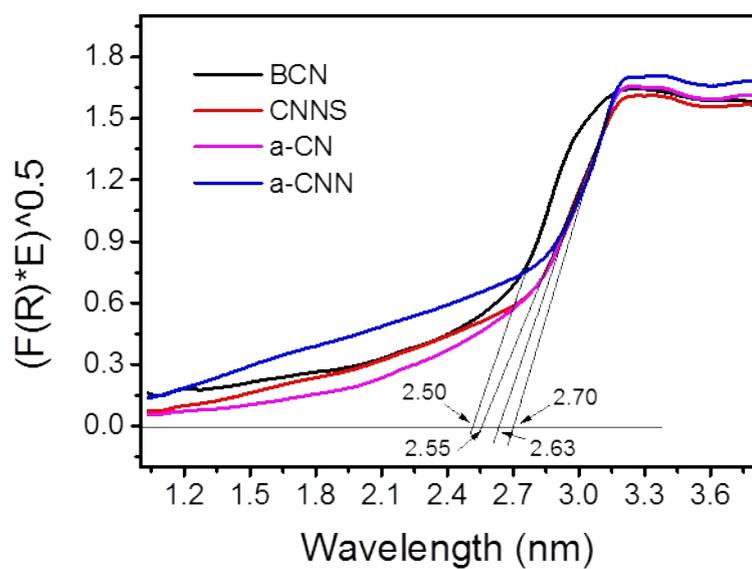**Figure S2** AFM images of (a) BCN, (b) CNNS, (c) a-CN and (d) a-CNN.

Figure S3 XRD patterns of samples and (b) the enlargement of (a) in the range of 25° to 30°.
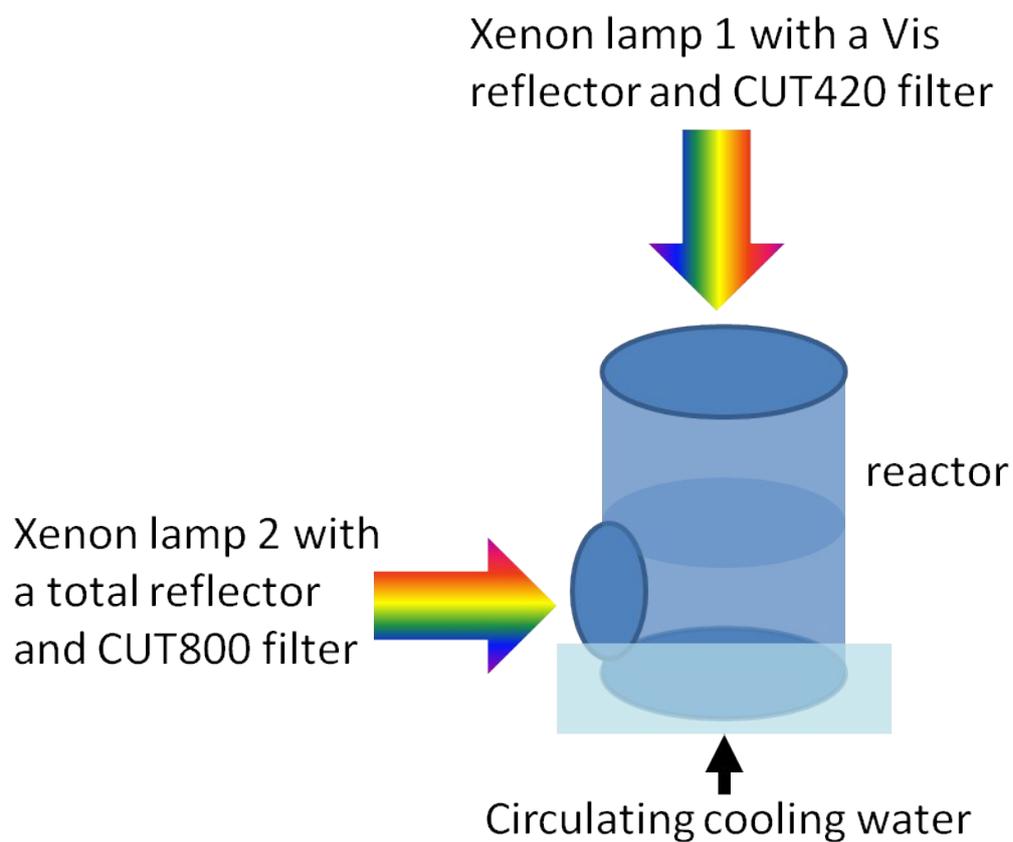
Figure S4 FTIR spectra of samples.

Figure S5 XPS survey of samples.

**Figure S6** Kubelka-Munk plot of samples resulted from Figure 3a.

Figure S7 The schemata of the experimental set-up for the Photocatalytic hydrogen evolution

properties illuminated by dual Xenon lamp irradiation. Lamp 1 provides light covering

Visible light range and lamp 2 with a CUT800 filter gives out NIR light.
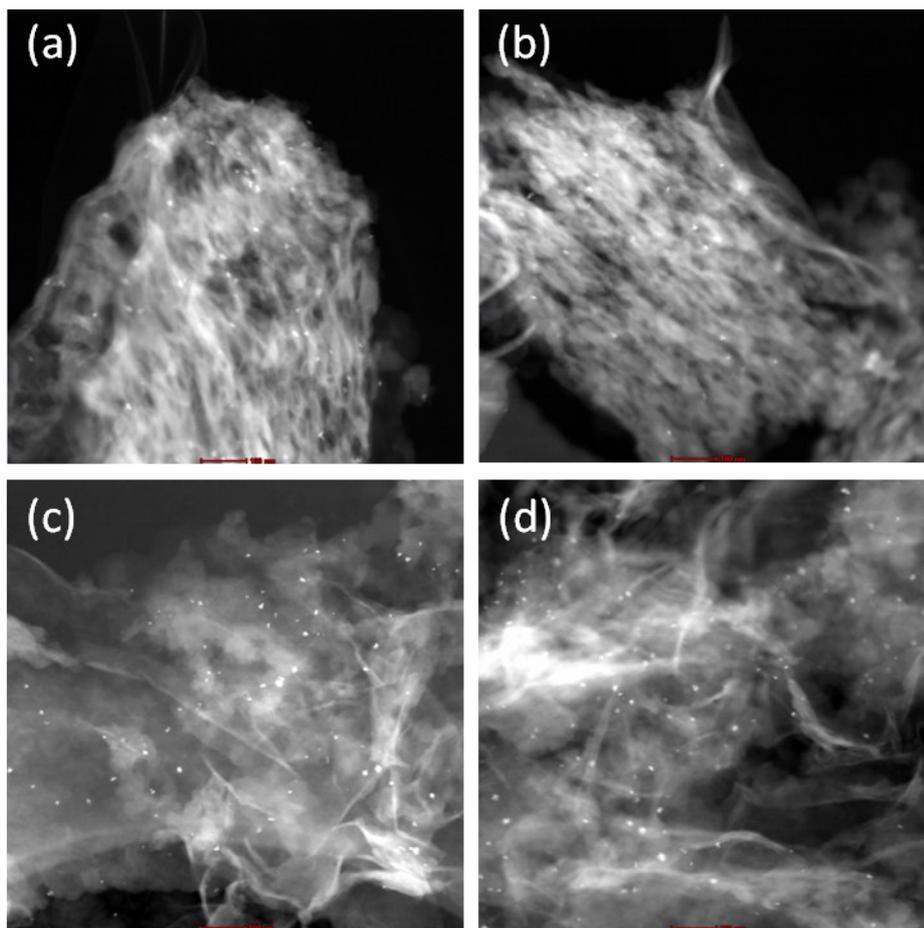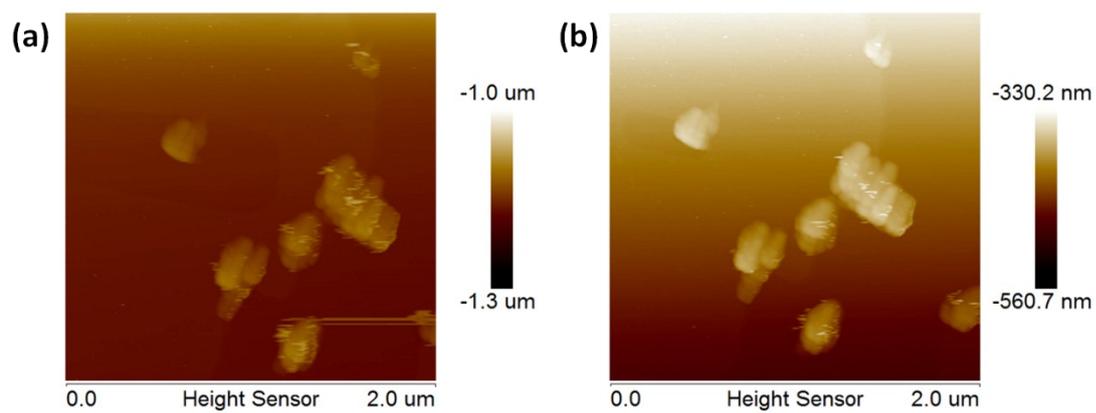
Figure S8 High-Angle Annular Dark Field (Acquire HAADF Scanning) images of samples after photocatalytic reaction. The 3 wt% added Pt elements are distributed as cluster in samples.
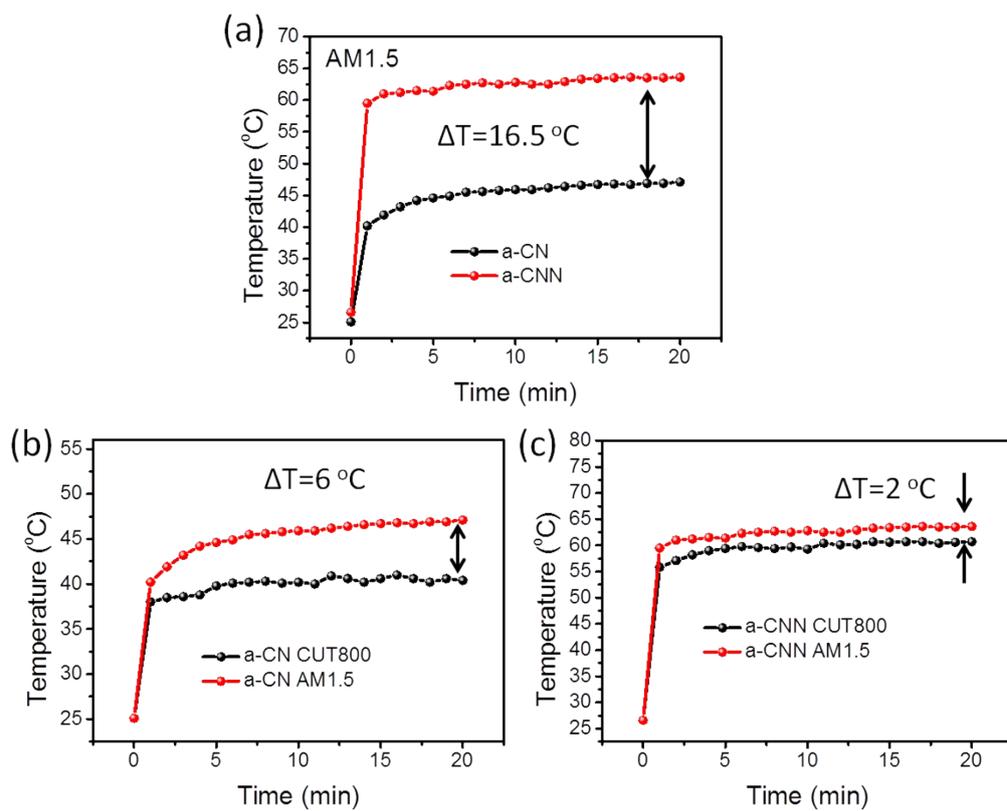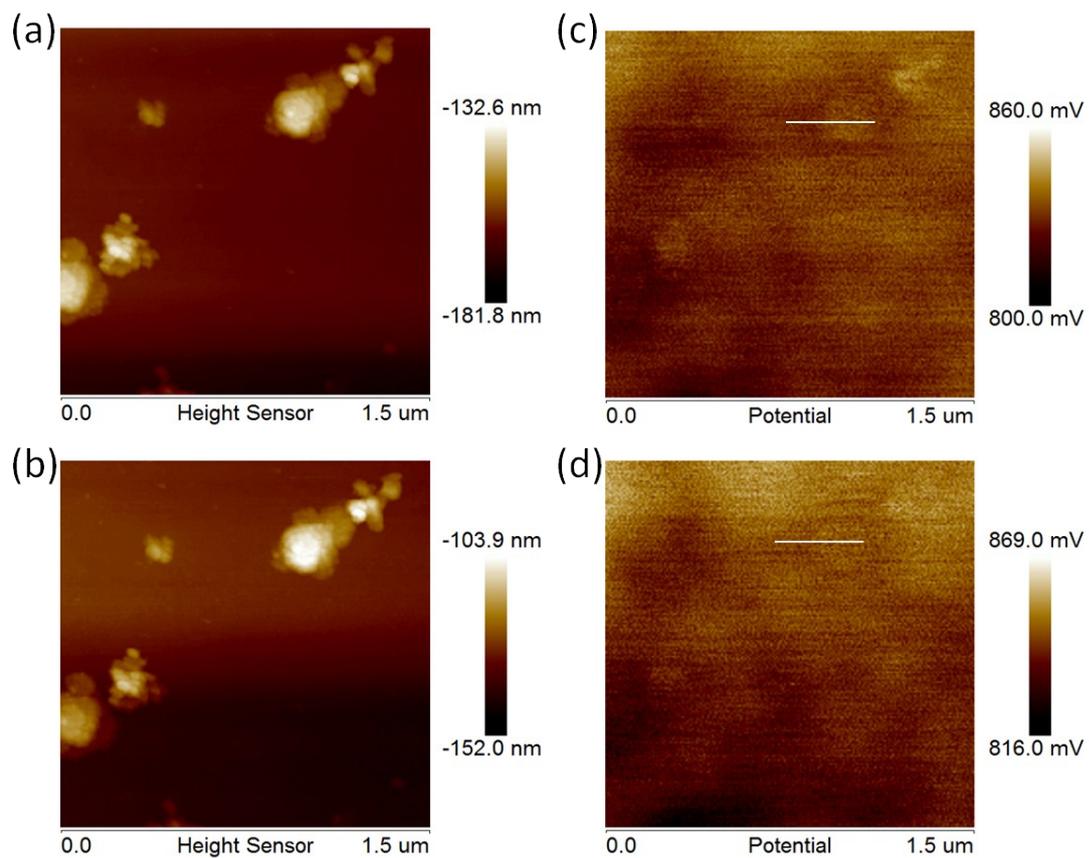
Figure S9 Time-dependent temperature variation of a-CN and a-CNN under different light (Xenon lamb equipped with AM1.5 and CUT800 filter, all light intensity was fixed on 100 mW cm^{-2}).
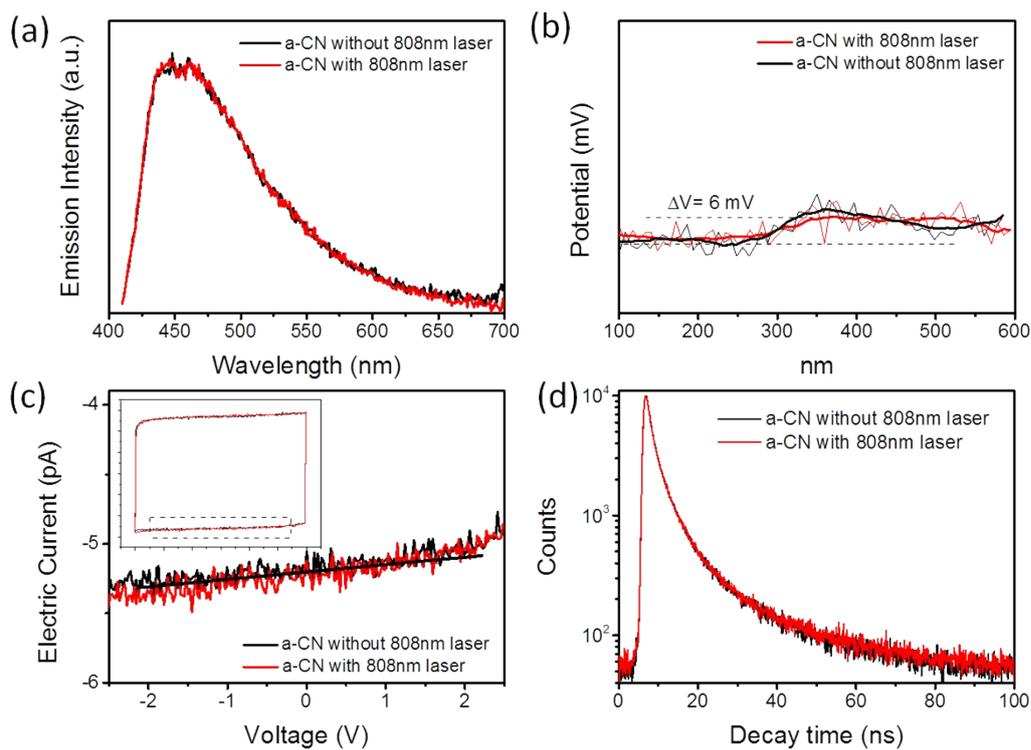
Figure S10 (a) the PL spectra of a-CN with/without 808 nm laser irradiation, (b) the surface potential difference of the white line in Figure S15 (c) and (d) characterized by KPFM, (c) I-V curve of a-CN with/without 808 nm laser irradiation and (d) Ultrafast time-resolved spectroscopy of a-CN with/without 808 nm laser irradiation.

Figure S11 The corresponding AFM images for Figure 5c and d, respectively.

(a)

-132.6 nm

-181.8 nm

0.0   Height Sensor   1.5 um

(c)

860.0 mV

800.0 mV

0.0   Potential   1.5 um

(b)

-103.9 nm

-152.0 nm

0.0   Height Sensor   1.5 um

(d)

869.0 mV

816.0 mV

0.0   Potential   1.5 um

Figure S12 The AFM images (a) and (b). (c) and (d) are the corresponding surface potential characterized by KPFM, respectively.