

Electronic Supplementary Material for Analytical Methods

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ELECTRONIC SUPPLEMENTARY INFORMATION

High-throughput photo-chemiluminescence imaging for HIV DNA determination based on a sulfur-doped graphitic carbonitride photocatalyst

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Characterization of the p-SCNNSs

We synthesized ultrathin sulfur-doped g-C₃N₄ porous nanosheets (SCNNSs). The majority of carriers in SCNNSs were changed from electrons to holes by doping S element to n-type g-C₃N₄. The crystal phase of the synthesized material was analyzed by XRD. It can be seen that the XRD pattern of p-SCNNSs. The XRD patterns of g-C₃N₄ and p-SCNNSs show two obvious diffraction peaks at 13.0° and 27.4° (Fig. S1A). These peaks can be indexed as peaks (100) and (002) of graphite material. The results show that p-SCNNS has no effect on the phase composition and crystallite size of g-C₃N₄, which is consistent with that of g-C₃N₄.

The FT-IR spectra of g-C₃N₄ and p-SCNNSs shown in Fig. S1B, with respect to g-C₃N₄, a series of peaks in the region of 1200-1600 cm⁻¹ can be related to the typical stretching modes of CN heterocycles, wherein the peak located at 810 cm⁻¹ is assigned to the bending vibration of heptazine rings, indicating the major structure of g-C₃N₄ was retained after the doing of S element and the further thermal condensation process. The broad absorption band located at around 3000-3300 cm⁻¹ can be attributed to the stretching vibration of N-H or O-H bond, It should be noted that due to the relatively low concentration of S element and the overlap effect of these strong CN vibrations, the vibration band

referring to S-related functional groups can hardly be observed.

TEM observation revealed the sheet structure of p-SCNNSs (Fig. S2), which showed that the size of the nanosheet was about 200 nm.

XPS measurements were conducted to gain insight into the chemical composition and chemical status of the elements in the synthesized samples. The survey spectra reveal that C and N and S elements existed in the samples, The high-resolution C_{1s} XPS spectrum (Fig. S3A) can be deconvoluted into three peaks at 284.6 eV, 285.4 eV and 288.2 eV. The peak at 284.6 eV is identified as graphitic carbon (C-C, C=C). The binding energy of 285.4 and 288.2 eV corresponds to a C-N-C coordination, indicating that carbon was present in three diverse chemical states ascribed to the carbon species adsorbed on the surface of p-SCNNSs. Fig. S3B shows the XPS spectrum of N 1s, which was deconvoluted into four peaks at 398.6 eV, 399.4 eV and 400.6 eV and 404.7 eV. The peak at 398.6 eV was typical of the sp^2 -hybridized nitrogen (C-N-C), the peaks at 399.4 eV corresponded to (C-N-H), the peaks at 400.6 eV corresponded to tertiary nitrogen N-(C)₃ groups, and the peak at 404.7 eV is attributed to the charging effect. The Fig. S3C showed the binding energies collected for $S_{2p} 3/2$ and $S_{2p} 1/2$ are determined as 164.0 eV and 165.0 eV, The XPS results further confirmed the presence of graphite-like sp^2 -bonded structure in p-SCNNSs.

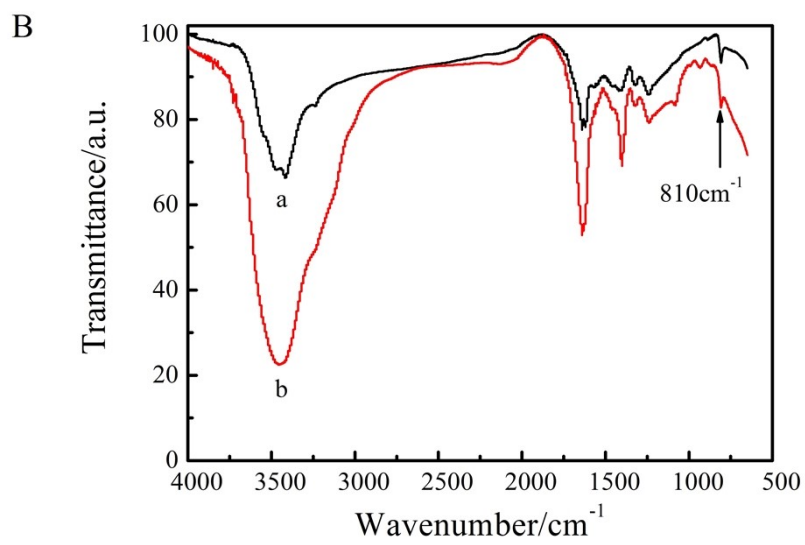
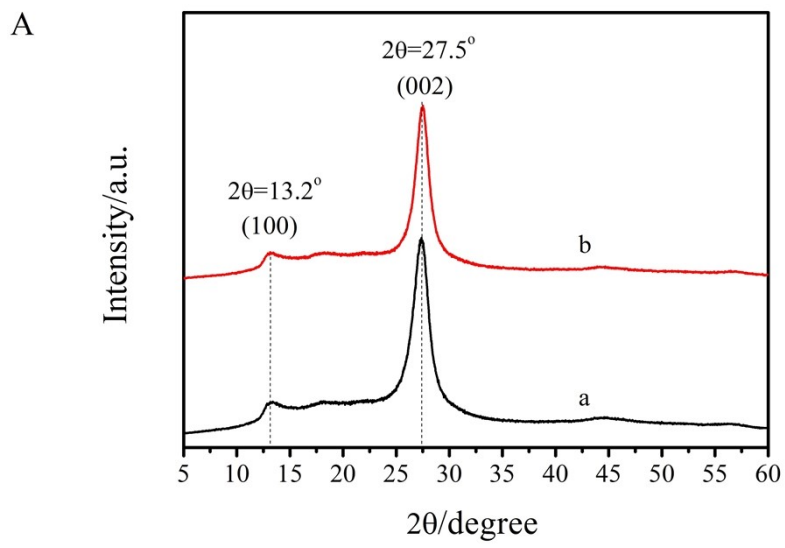


Figure S1. XRD patterns(A) and FT-IR spectra(B) of g-C₃N₄.

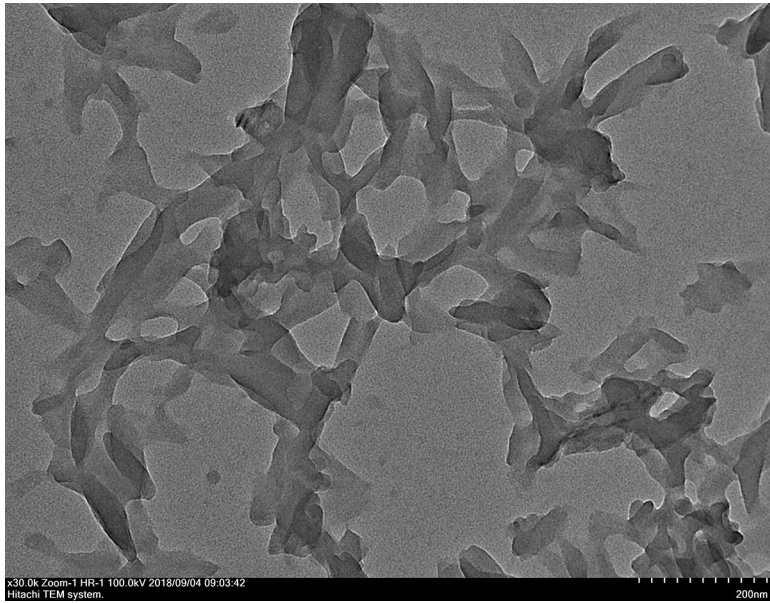


Figure S2. TEM images of g-C₃N₄.

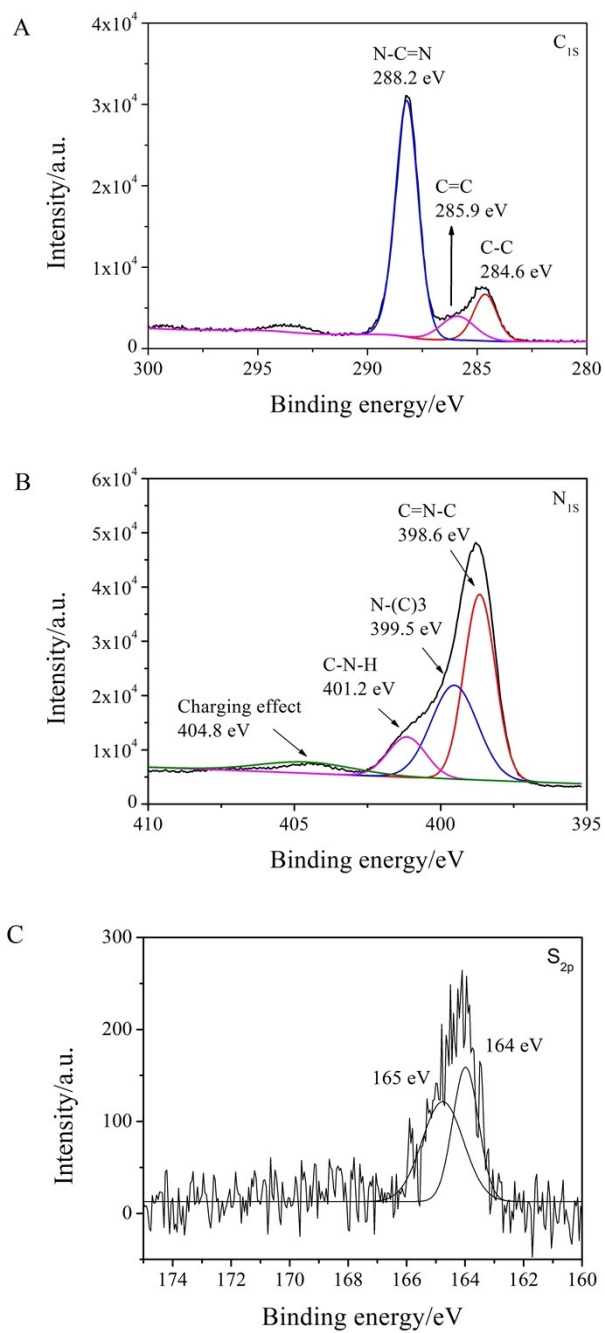


Figure S3. High-resolution XPS spectra for (A) C 1s, (B) N 1s of g-C₃N₄.