Electronic Supplementary Material (ESI) for RSC Advances.

Construction of a Binary S-scheme S-g-C_3N_4/Co-ZF Heterojunction with Enhanced Spatial Charge Separation for Sunlight-driven Photocatalytic Performance

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Materials characterization

Using Cu K radiations (1.5406 Ao), 40 mA of applied current in increments of 0.040, and an accelerating voltage of 40 KV, the crystalline structure of the samples was seen on a D8 Burkur powder X-ray diffractometer, which ranged from 20 to 80°. Using a transmission electron microscope, the surface morphologies of the photocatalysts were examined (TEM, JEOL-JEM-1230). The 5,5-dimethyl-1-pyrroline-N-oxide (DMPO) solvent was used to perform the ESR signals on a JES FA200 spectrometer from JEOL Co. Alpha Bruker-Rays Fourier transform infrared spectrophotometer, operating in the 4000-400 cm^{-1} range, was used to perform the functional group analysis of the materials. A UV-visible spectrophotometer (Shimadzu, UV-1700) with a wavelength of 200-800 nm was used to evaluate the effectiveness of sample

degradation. On a multifunctional Kratos Axis-Ultra X-ray spectrometer, XPS evaluations were carried out. All BEs were consistent with respect to the charge effect's charge effect shift at the C1s peak (284.8 eV) of the surface adventitious C. Through N2 adsorption in an electronic gas-sorption apparatus, the BET surface area was examined (using a Micromeritics ASAP 2020 equipment). Pt wire served as the counter electrode, photocatalyst-coated FTO served as the working electrode, and Ag/AgCl served as the reference electrode in transient photocurrent response experiments using a conventional three-electrode setup (CHI 602 Electrochemical Workstation) at 25 oC. A 20 mV signal amplitude was used to measure the EIS at -0.6 V (vs. Ag/AgCl) from 10^5 to 0.1 Hz.

Photocatalytic activity measurements

To evaluate the photocatalytic effectiveness of produced NPs and NCs, the MB was employed as the reference pollutant. A concentration of 0.012 gL^{-1} of photocatalyst (0.1 g) was disseminated in 100 ml of MB aqueous solution in order to carry out the photocatalytic reactions. After that, the suspension was stirred magnetically in the dark for 30 minutes to achieve adsorption-desorption equilibrium. After that, it was in direct sunshine for 60 minutes. The UV-visible spectrophotometer used to evaluate the 5 mL aliquots was used to record changes in the absorption band (664 nm) of the MB's UV-visible spectra.

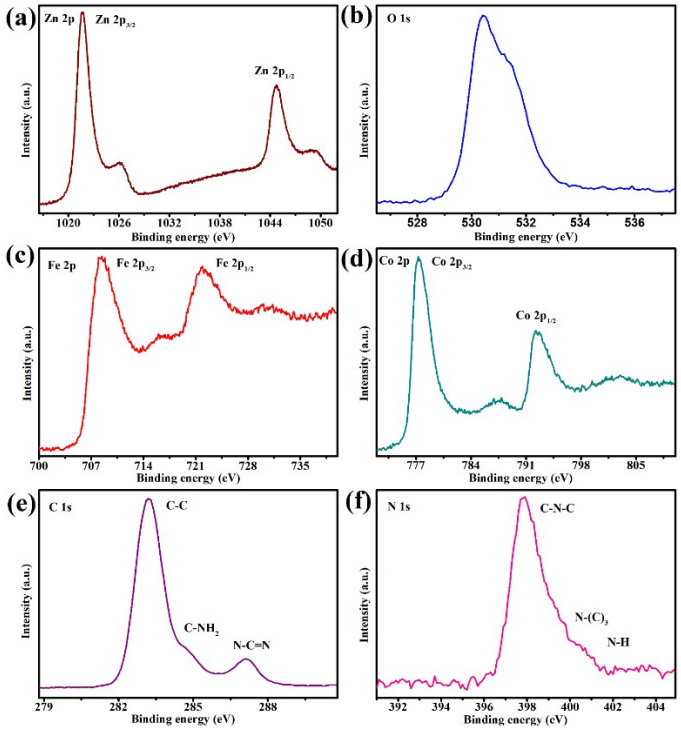

Figure S1. High-resolution XPS spectra of 48 % NC of S-g-C_3N_4/6 % Co-ZF; (a) Zn 2p, (b) O 1s, (c) Fe 2p, (d) Co 2p, (e) C 1s and (f) N 1s.

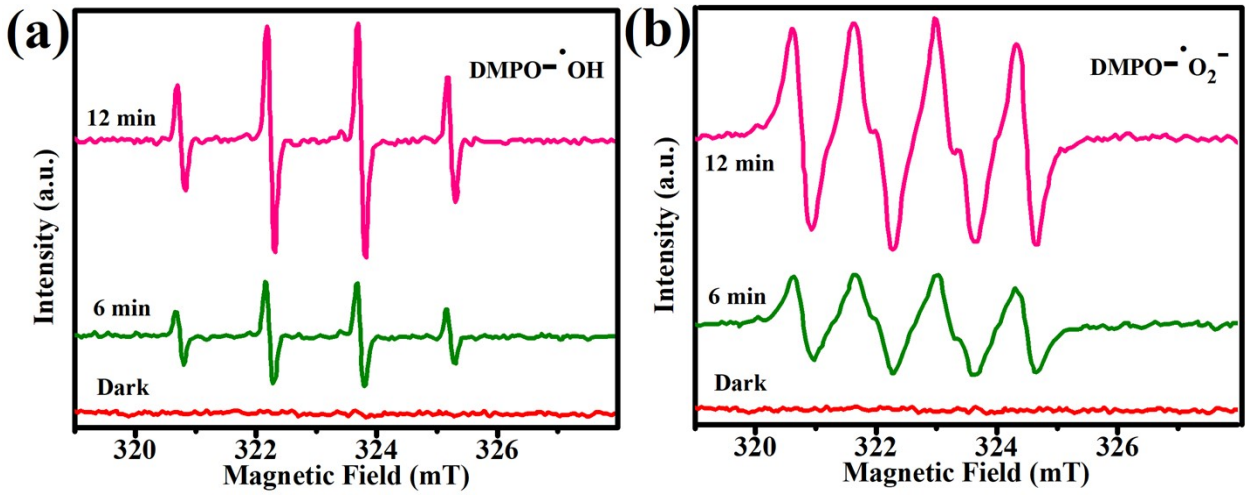

Figure S2. ESR spectra of 48 % NC of S-g-C_3N_4/6 % Co-ZF NCs: (c) in aqueous suspension for DMPO$^-$•OH and (d) in methanol suspension for DMPO$^-$•O_2^- under visible light radiance.