**Text S1** The detailed test conditions of HPLC.

**Text S1.** The model of the high-performance liquid chromatograph is HPLC-DAD, with Agilent C18 (100 mm × 4.6 mm, 5 μm) column at the wavelength of 278 nm. The mobile phase used in the test was 0.025 M phosphate buffer salt: acetonitrile (V/V = 3:2). Phosphate buffer salts were prepared with ultrapure water. The flow rate was 1.0 mL $min^{-1}$, the column temperature was 25 °C, and the injection volume was 10 μL.

**Text S2** Electrochemical measurement.

**Text S2.** All electrochemical tests were measured in a three-electrode system using an electrochemical analyzer (CHI 760E, Shanghai Chenhua, China). 0.1 M $Na_2SO_4$ was used as the electrolyte. A Pt electrode, a saturated silver chloride electrode, and sample-coated electrode were employed as the counter, reference, and working electrodes, respectively. The potential sweep range of CV curve was 1 to –1 V, and the scan rate was 100 mV $s^{-1}$. EIS was measured with an amplitude of 5 mV in the frequency range of 0.01 Hz to 100 k Hz. Linear sweep voltammetry (LSV) was measured at potentials from 0 to 1.5 V (vs. Ag/AgCl) with a scanning rate of 50 mV $s^{-1}$. I-t curves were obtained at 0 V vs. Ag/AgCl.

**Text S3** The test parameters of EPR.

**Text S3.** The magnetic field range was 3460–3560 G. The microwave frequency was 9.85 GHz. The modulation amplitude was 1 G. The microwave power was 20 mW.

**Text S4** The kinetic analyses.

**Text S4.** The pseudo-first-order kinetic model was used to fit the curves of NOR degradation by CCA-x. The degradation curves can be described by Equations S1:

$$-\mathrm{Ln}\ (C_t/C_0) = kt \quad \text{(S1)}$$

Where $C_0$ and $C_t$ are the NOR concentrations (mg $L^{-1}$) at the initial time and at time t (min), respectively, and k is the degradation reaction rate constant ($min^{-1}$).

**Text S5** Calculation of relative contribution of •OH, $SO_4^{\bullet-}$, and non-radical pathways.

**Text S5.** To further evaluate the contribution of active species, the reaction rate constant without quencher is defined as $k_0$. The reaction rate constants for methanol and FFA are defined as $k_1$ and $k_2$, respectively. The relative contributions of $SO_4^{\bullet-}$/•OH ,$^1O_2$ and electronic transfer were calculated according to the Eqs. S2, S3 and S4, respectively.

$$\lambda(SO_4^{\bullet-}/\bullet OH) = [(k_0 - k_1) / k_0] \times 100\% \quad (S2)$$

$$\lambda(^1O_2) = [(k_0 - k_2) / k_0] \times 100\% \quad (S3)$$

$$\lambda(\text{electronic transfer}) = 1 - \lambda(SO_4^{\bullet-}/\bullet OH) - \lambda(^1O_2) \quad (S4)$$

where λ represents the contribution of ROS to the degradation of NOR.

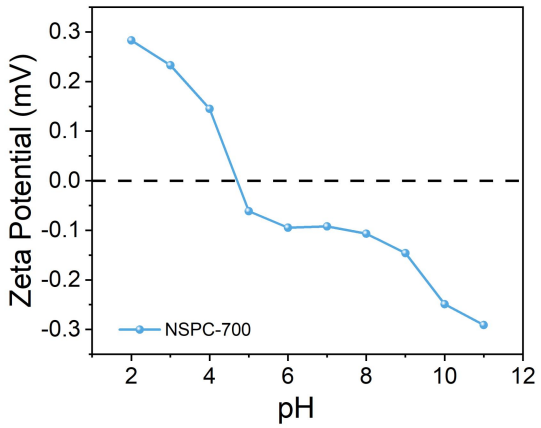



**Fig. S1** Zeta potential of NSPC-700 versus solution pH.

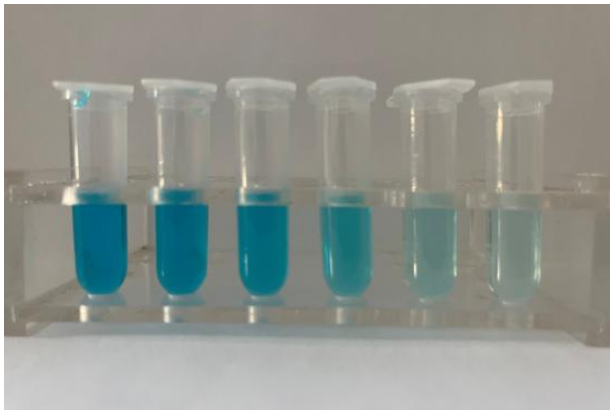
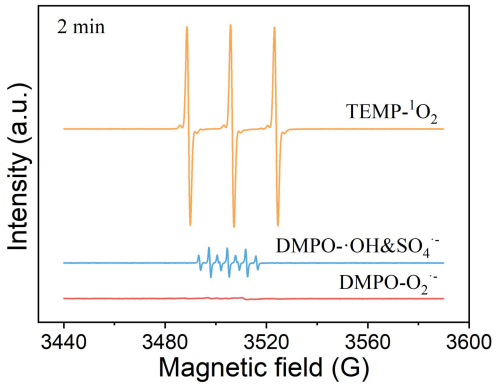


**Fig. S2** Degradation results of methylene blue in 2 h.

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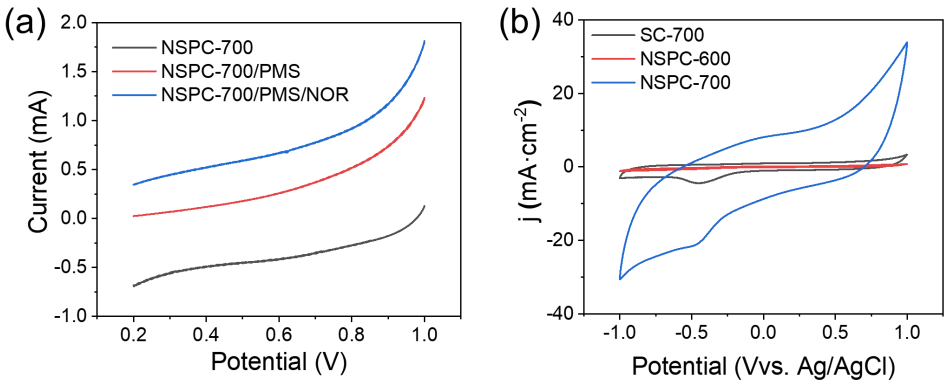
44 **Fig. S3** Comparison of EPR spectral intensities of different ROSs.

45

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47 **Fig. S4** (a) LSV curve of NSPC-700. (b) CV curves of SC-700, NSPC-600 and NSPC-700.

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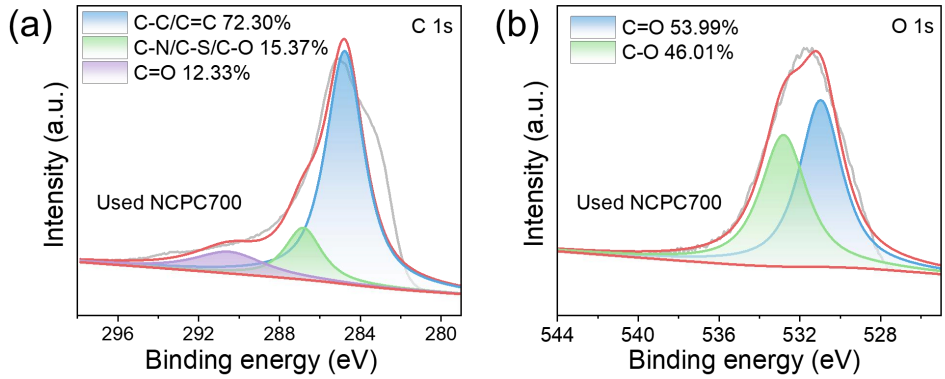


**Fig. S5** XPS spectra of used NSPC-700 for (a) C 1s and (b) O 1s.

52 **Table S1** BET surface area and porosity parameters of the catalysts

| Sample | BET surface area ($m^2\ g^{-1}$) | Total Pore volume ($cm^3\ g^{-1}$) | Micropore volume ($cm^3\ g^{-1}$) | Average pore diameter (nm) |
|---|---|---|---|---|
| NSPC-700 | 1219.31 | 0.87 | 0.46 | 3.19 |
| C-700 | 23.58 | 0.022 | 0.01 | 2.62 |

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**Table S2** The element content and proportion of NSPC-500 and NSPC-700

| Element | C (at%) | O (at%) | N (at%) | S (at%) |
|---|---|---|---|---|
| NSPC-500 | 70.81 | 12.05 | 15.76 | 1.37 |
| NSPC-700 | 80.27 | 8.54 | 10.70 | 0.48 |
| NSPC-700 (after used) | 77.35 | 9.40 | 12.77 | 0.48 |