Electronic Supplementary Materials

Chemicals and Reagents. Bisphenol A (BPA, ≥98%), phenytoin (PHT, ≥98%), diphenhydramine (DP, ≥98%), Tetracycline (TC, ≥98%), 5,5-dimethyl-pyrroline N-oxide (DMPO, 99%), N, N-diethyl-p-phenylenediamine sulfate (DPD, 98%) and copper nitrate hydrate ($Cu(NO_3)_2 \cdot 3H_2O$, ≥99%), L(+)-Ascorbic acid(≥99%), ammonium hydroxide solution (25%-28%) were purchased from Titan Scientific Co. (Shanghai, China). Hexadecyl trimethyl ammonium bromide (CTAB, 99%) were obtained from Macklin Biochemical Co. (Shanghai, China). Hydrogen peroxide (H_2O_2, 30%, w/w) were purchased from Chron Chemicals (Chengdu, China). Horseradish peroxidase (POD) were purchased from TCL Co. (Shanghai, China). Tetraethyl orthosilicate (TEOS, 99%) were purchased from Aladdin Co. (Shanghai, China). Cyclohexane (≥99.5%) were purchased from ThermoFisher Scientific Co. (China). All water involved in the experiment was deionized water purified by EPED (Water Purifier Co., China).

Material Characterization. The surface morphology and elemental composition of the catalysts were obtained by a scanning electron microscope (Hitachi Regulus8100) and a transmission electron microscope (FEI Talos F200X). The crystallinity of the catalysts was characterized by Philips X'Pert PRO SUPER diffractometer (XRD). The functional groups on the catalyst surface were detected by a Bruker Vertex 70 FTIR spectrometer. X-ray photoelectron spectroscopy (XPS) (PHI-5000versaprobeIII) was used to collect elemental information on the catalyst surface. An electron paramagnetic resonance spectrometer (EPRS) model Bruker A300-10/12 was used for the detection of reactive oxygen species. The concentration of metal ions in the solution was detected by ICP-OES(PerkinElmer Optima 5300 DV) to the stability of the catalysts.

HPLC Measurements. All of the pollutants were analyzed with an Agilent 1260 Infinity HPLC instrument (Agilent) equipped with a UV detector and a Poroshell 120 EC-C18 column (100 mm × 4.6 mm, 2.7 μm) with a mobile phase consisting of a 70/30% (v/v) mixture of methanol and ultrapure water. The flow rate was set at 1 mL/min. The UV detector was set at 225 nm for BPA, 220 nm for PHT and IBU, 278 nm for CIP, and 221 nm for DP.

Radical Quenching Experiment. Radical quenching experiment was conducted during the BPA degradation experiment. TBA and BQ were used to quenching $^{\bullet}OH$ and $O_2^{\bullet-}$. 50 mL BPA solution (10.0 mg/L) containing 0.05 g catalyst and 1mM TBA/BQ were mixed in a beaker and stirred for 20 min to achieve adsorption-desorption equilibrium. Then the Fenton-like reaction was started with the adding of 10mM H_2O_2 (30% w/w) under continuous stirring throughout the experiment. The suspensions were collected at different time point and filtered by a hydrophobic membrane with pore size of 0.22 μm for detection. The concentration of BPA in the samples were measured by a high-performance liquid chromatography (HPLC, A20 series; Shimadzu) and an UV-DAD (wavelength 225 nm).

LC-MS analysis. The mobile phase was a mixture of ultrapure water (containing 0.1% formic acid) and acetonitrile. The ion source was an electrospray ion source (ESI); the scanning mode was negative ion sweep; the ion spray voltage was 2.5 KV; the cone hole voltage was 50 V; the ion source atomization temperature was 600 degrees; the dissolvent gas flow rate was 1100 L/h; the cone hole gas flow rate was 150 L/h; the nebulizer gas flow rate was 7 Bar; the collision gas flow rate was 0.15 mL/min; the detection mode was multiple reaction monitoring (MRM) modes. The detection mode is the multiple reaction monitoring (MRM) mode.

3D-EEM fluorescence measurements. 0.05 g of the catalyst mixed with 50 mL of the actual wastewater (35 ℃) in an appropriate volume glass beaker. The suspension was stirred for approximately 15 min and then added H_2O_2 (10 mM) triggering Fenton reaction. At certain intervals, 3 mL reaction suspension was collected with a syringe and filtered with a filter (0.45 μm) for follow-up analysis.

Three-dimension excitation-emission matrix (3D-EEM) fluorescence spectra of various samples were obtained on an F-7000 spectrometer (HITACHI) with a xenon excitation source, and slits were set to 5 nm for both excitation and emission. The excitation wavelengths were incremented from 200 to 450 nm in 5-nm steps; for each excitation wavelength, the emission was detected from 300 to 550 nm in 5-nm steps.

EPR measurements. BMPO/TEMP-trapped EPR signals were detected in different air-saturated methanol/aqueous dispersions of the corresponding samples using a Bruker A300-10/12 EPR spectrometer at room temperature (25°C-30°C). To detect $^{\bullet}OH$, 0.001 g of the prepared powder sample was added to 500 μL of water. Then, 100 μL of the above suspension, 10 μL of BMPO (250 mM) and 50 μL of H_2O_2 (30%, w/w) were mixed thoroughly and then left to stand for 1 min before being drawn into a capillary for detection. To detect $HO_2^{\bullet}/O_2^{\bullet-}$, the steps were the same as above except that water was replaced with methanol. To detect $^1O_2$, the steps were the same as that of detecting $^{\bullet}OH$ except that BMPO was replaced with TEMP.

Toxicity assessment. The toxicity of BPA and intermediates was evaluated via Toxicity Estimation Software (T.E.S.T.). Before calculating toxicity, select the project to be evaluated in the "Endpoint" field and choose "Consensus" in the "Method" field, and then enter the chemical formula of the target compounds in the "Draw

Chemical" field or enter the CAS/SLIMES/Name/InChi/ InChiKey/DTXSIT of the target in the search field. The data could be acquired after clicking “Calculate!”.

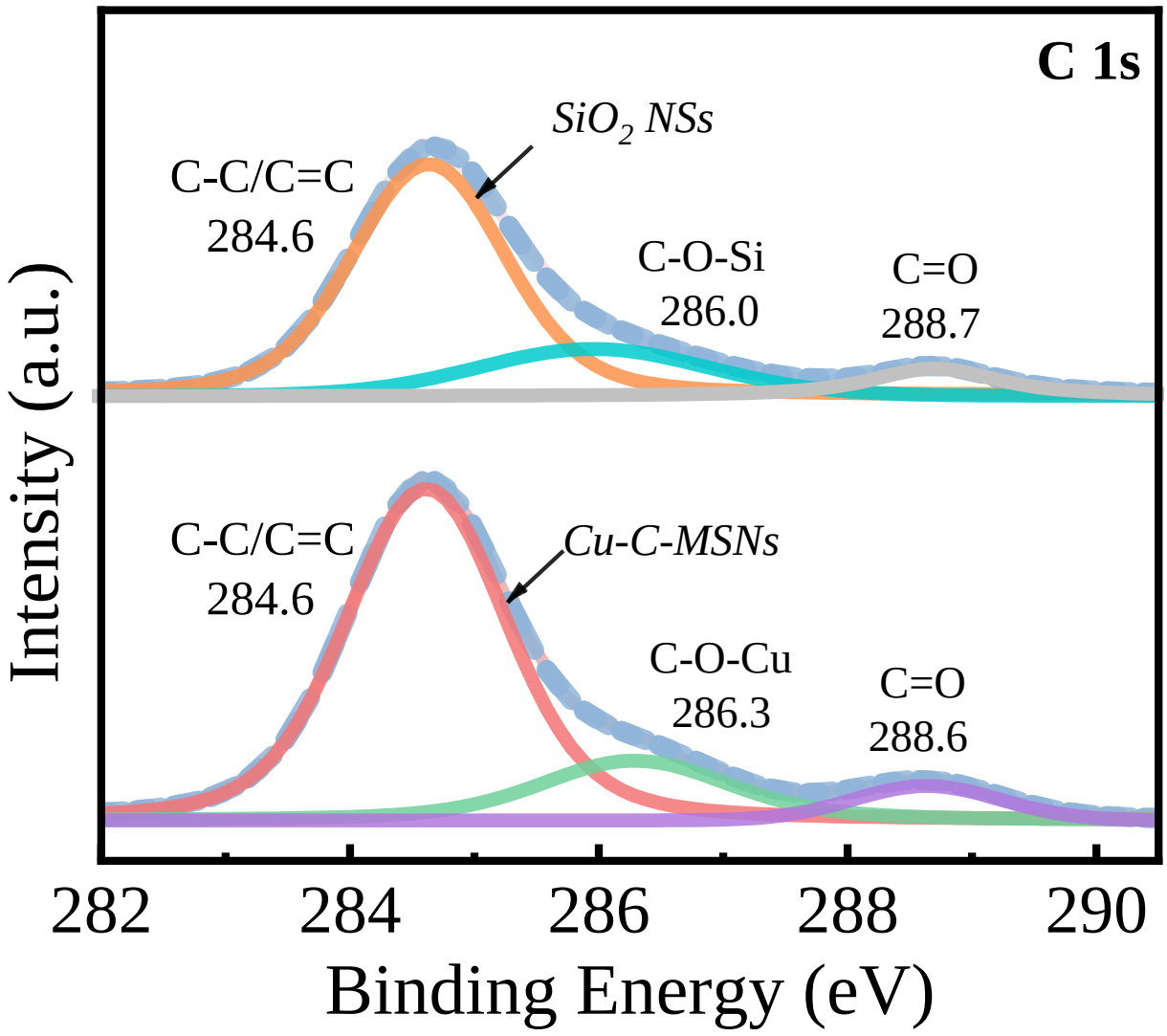


Fig. S1 C 1s XPS spectra for Cu-C-MSNs.

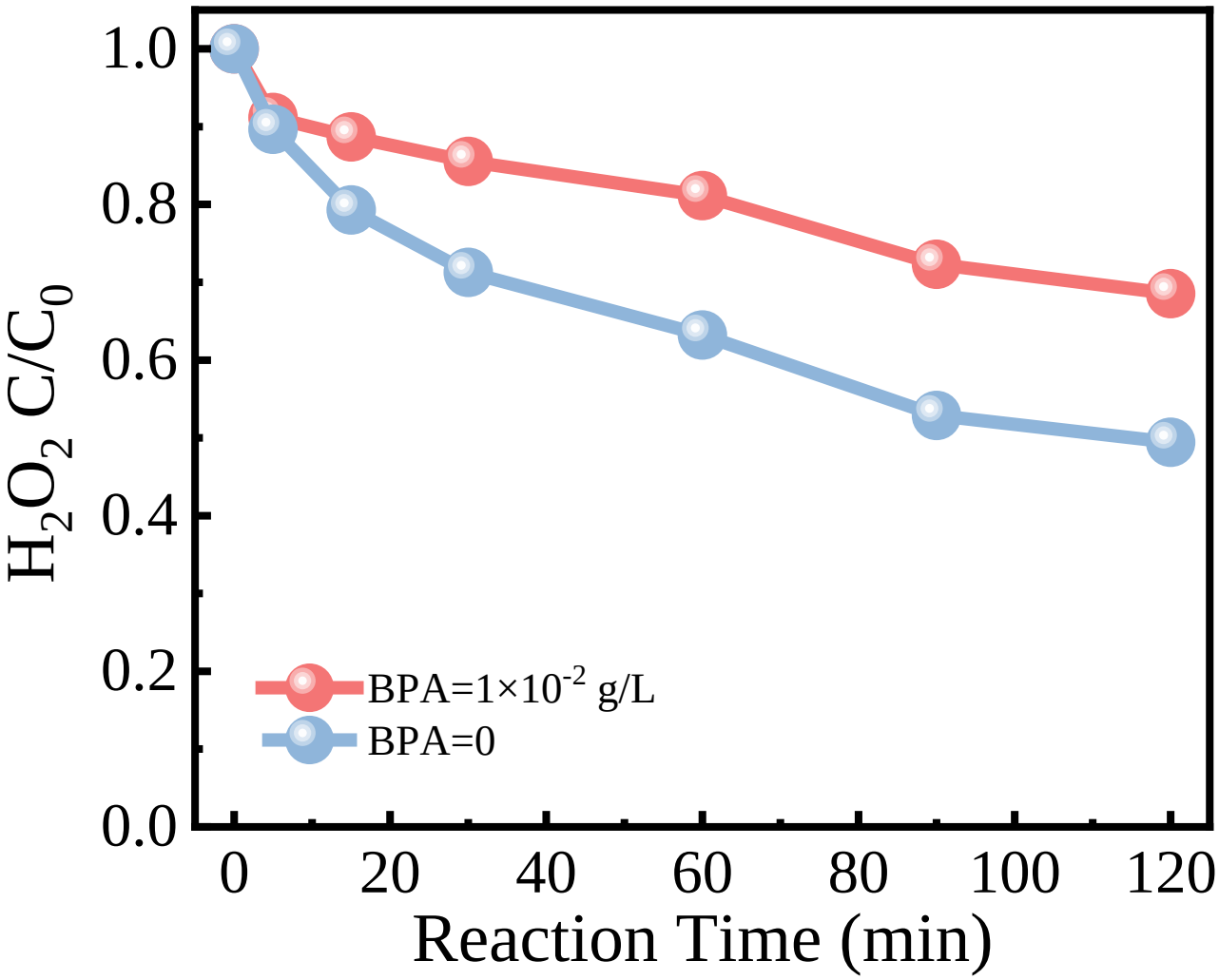


Fig. S2 H_2O_2 concentration change curve with/without BPA.

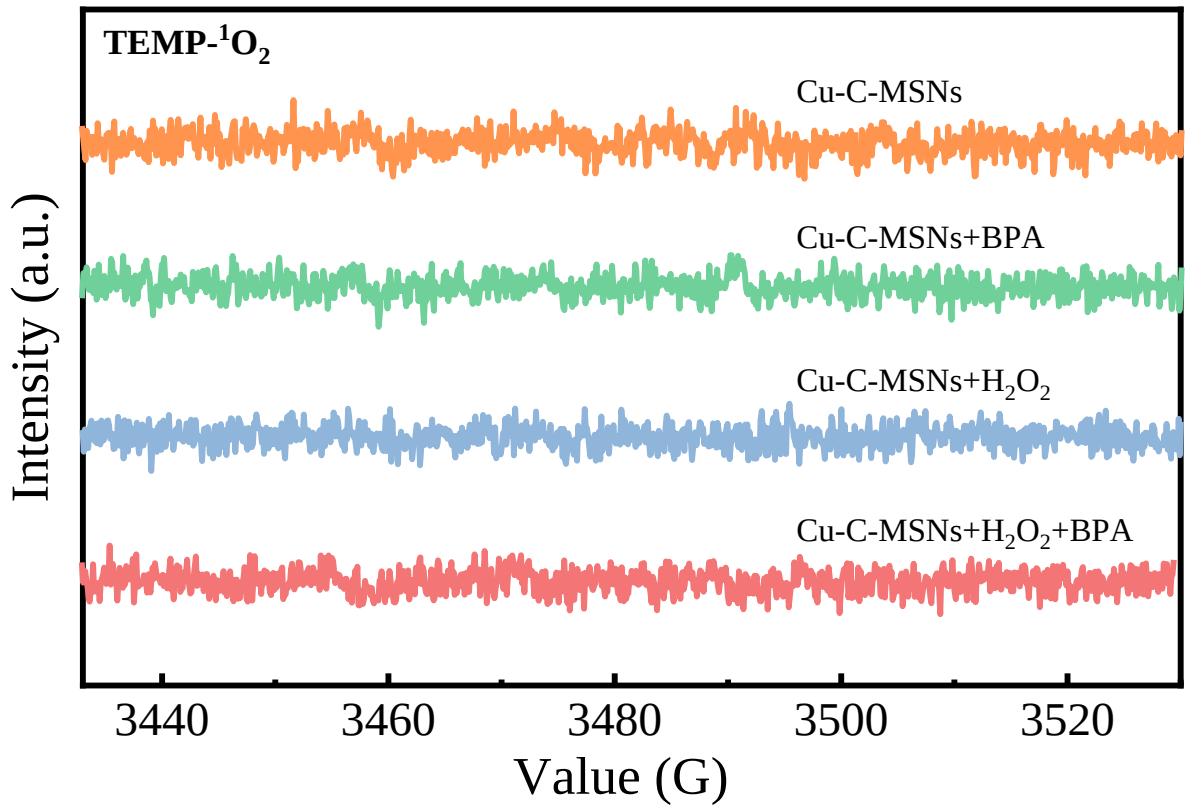


Fig. S3 TEMP trapped $O_2^{\bullet-}$ various aqueous.

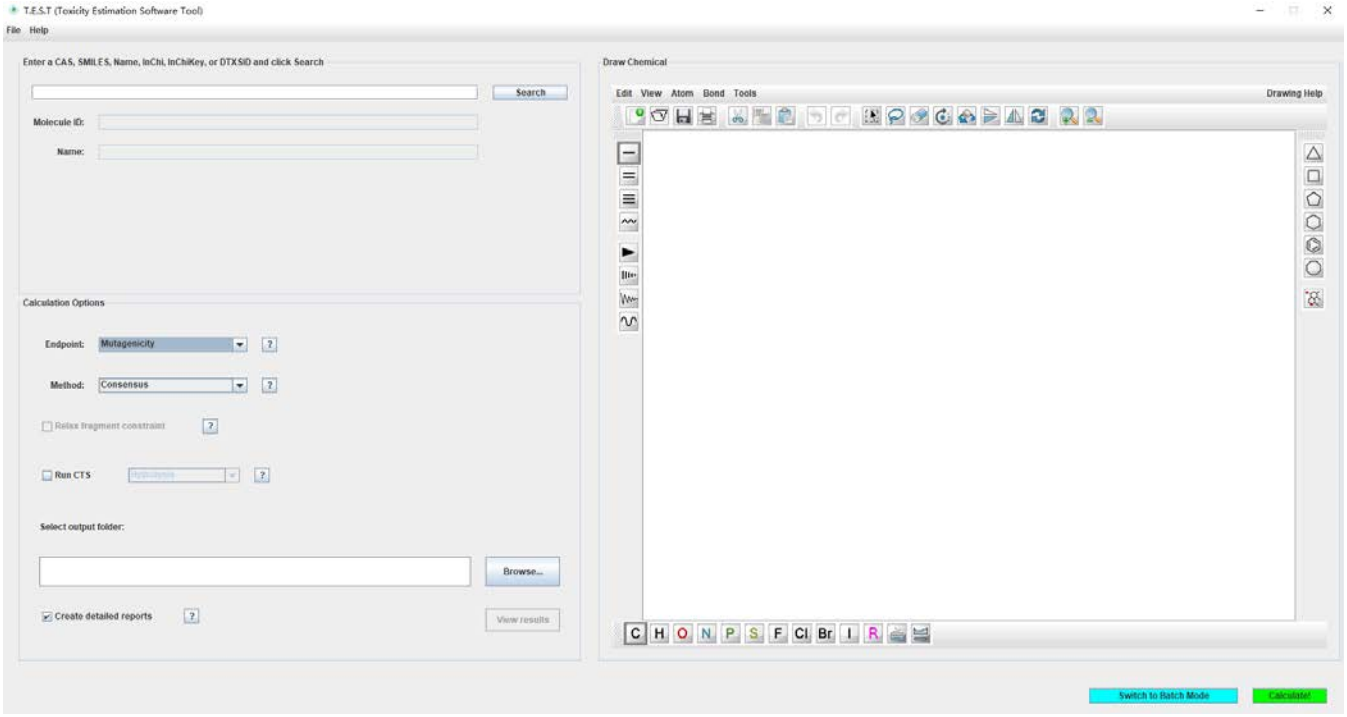
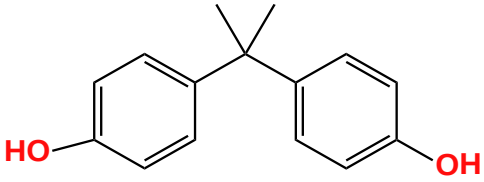
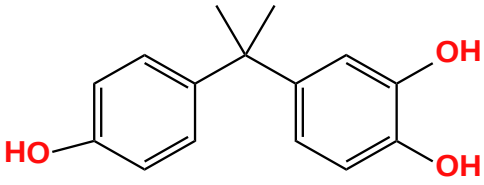
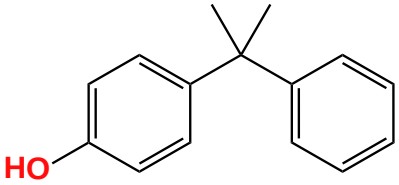
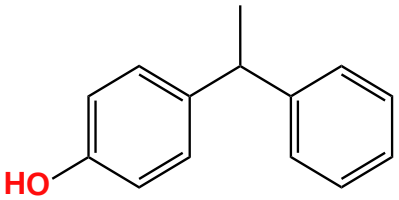
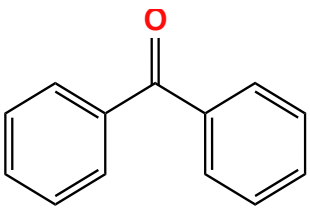
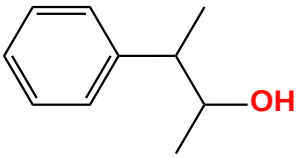
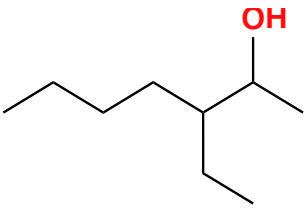
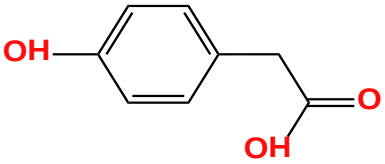
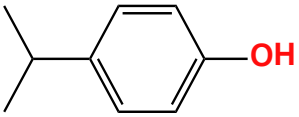
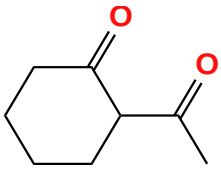
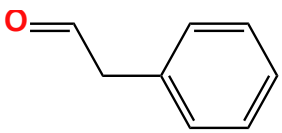
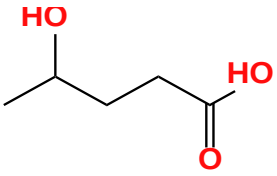
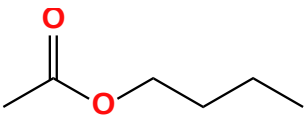
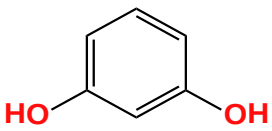
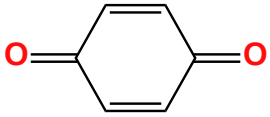


Fig. S4 The operation interface of Toxicity Estimation Software (T.E.S.T.)

Table S1 The intermediate products detected in the LC-MS mode, which including exact mass (m/z) and the chemical structure derived from molecular weight fragment mass spectra.

Compound	m/z	Product	Possible structure
BPA	228	Bisphenol A	
P1	242	5-Hydroxybisphenol A	
P2	211	4-Cumylphenol	
P3	197.8	4-(1-Phenylethyl) phenol	
P4	182.1	Benzophenone	
P5	150.2	3-Phenyl-2-butanol	

P6	145.7	3-Ethyl-2-heptanol	
P7	138.9	4-Hydroxyphenylacetic acid	
P8	135	4-Isopropylphenol	
P9	126.1	2-Acetylcyclohexanone	
P10	120.9	Phenylacetaldehyde	
P11	117.1	4-Hydroxypentanoic acid	
P12	115.2	Butyl acetate	
P13	111	Resorcinol	

P14	109	1,4-Benzoquinone	
P15	93	Phenol