Supplementary Materials for

Evaluation of the Heterogeneous Fenton Activity of Ash Derived from Ferric-Salt-Conditioned Waste Activated Sludge

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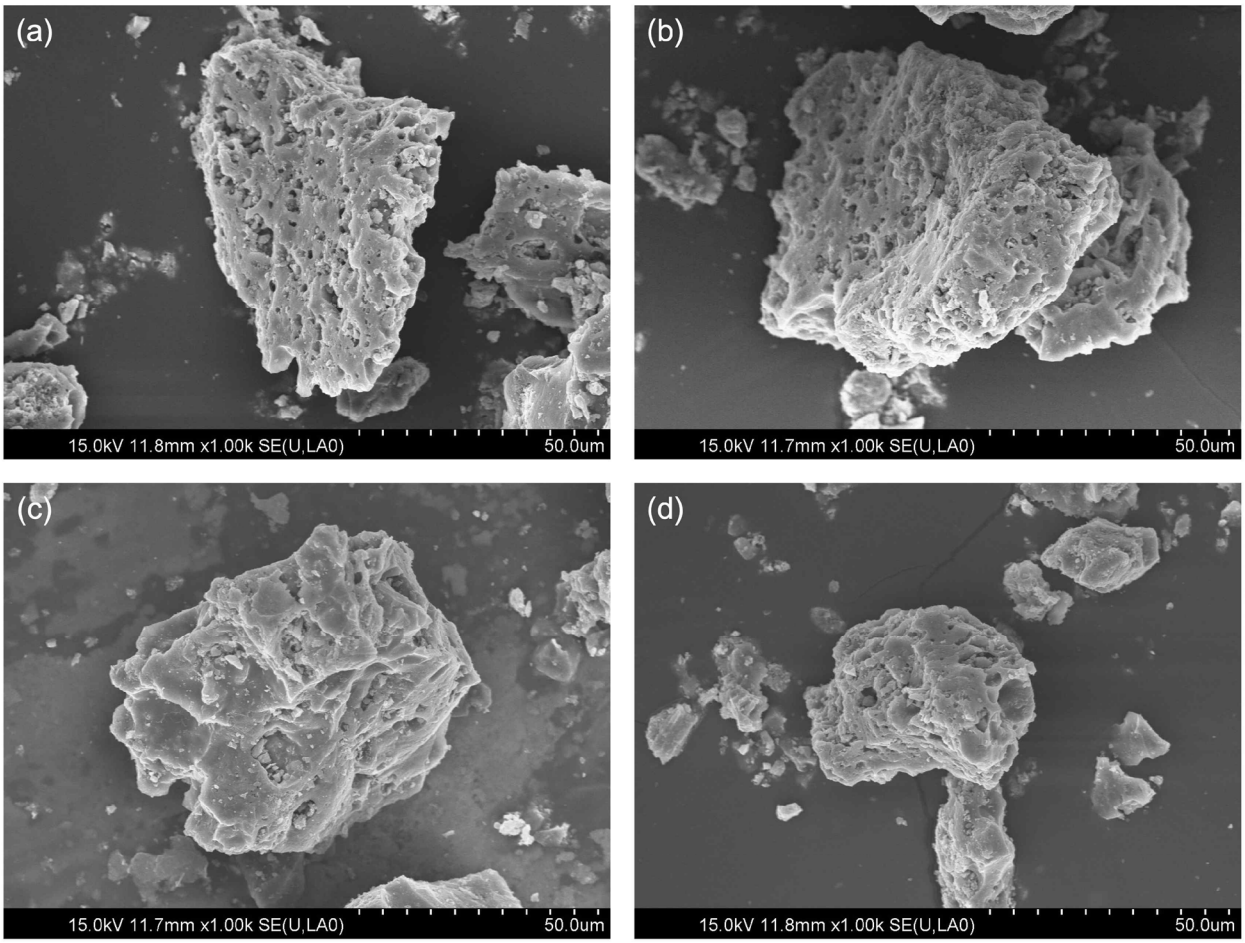


Figure S1. SEM images of the FeSA20 sample. All images were acquired at ×1,000 magnification with a scale bar of 50 μm.

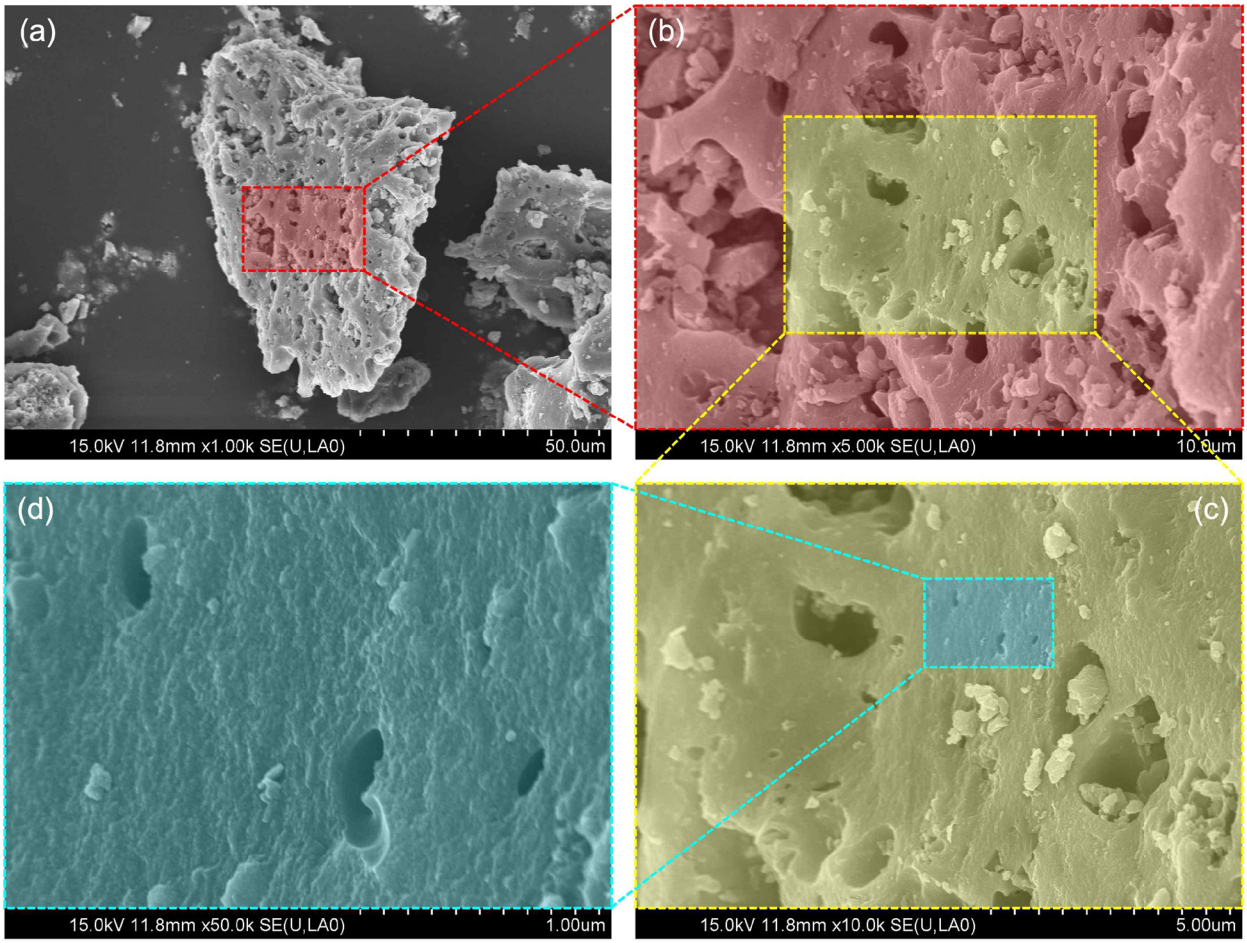
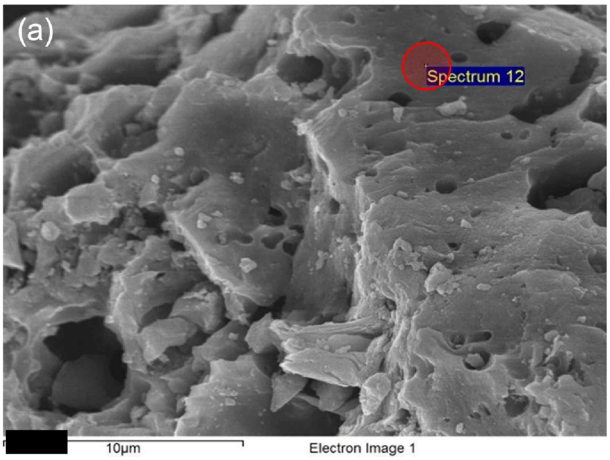
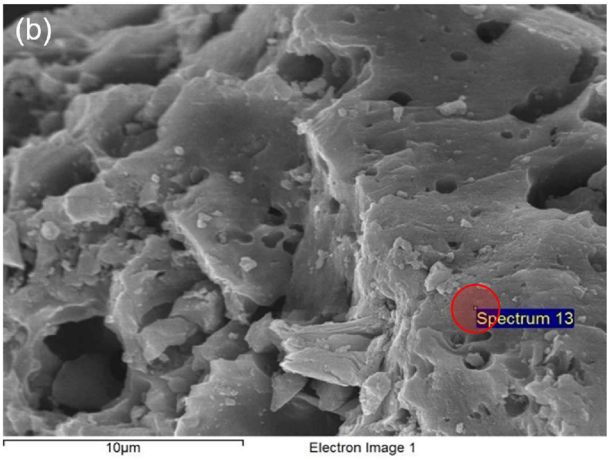


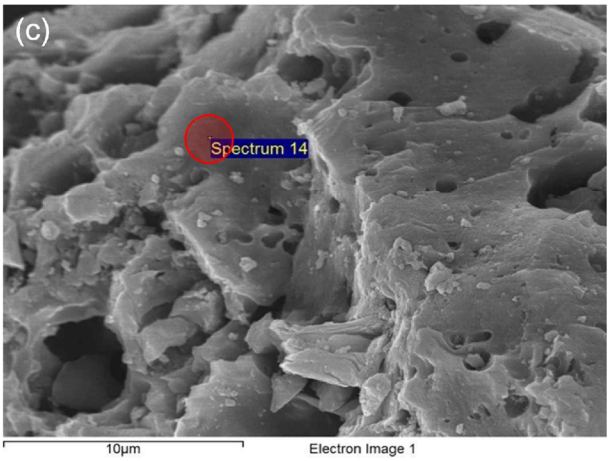
Figure S2. SEM images of the FeSA20 sample at progressively higher magnifications. Each panel shows an enlarged view of the highlighted region in the preceding image. The scale bars are 50 μm (a), 10 μm (b), 5 μm (c), and 1 μm (d).



Element	Weight (%)
C K	37.8
O K	38.9
Na K	0.9
Al K	1.0
Si K	0.7
S K	0.8
Cl K	0.8
Fe K	19.0
Total	100.0



Element	Weight (%)
C K	38.8
O K	37.8
Na K	1.1
Al K	1.1
Si K	0.4
S K	1.2
Cl K	0.9
Fe K	18.7
Total	100.0



Element	Weight (%)
C K	37.4
O K	34.5
Na K	0.9
Al K	1.2
Si K	0.5
S K	0.8
Cl K	1.3
Fe K	23.5
Total	100.0

Figure S3. Point EDS analyses of FeSA20 at three different locations. SEM images showing the locations of EDS measurements and the corresponding elemental compositions expressed as weight percentages.

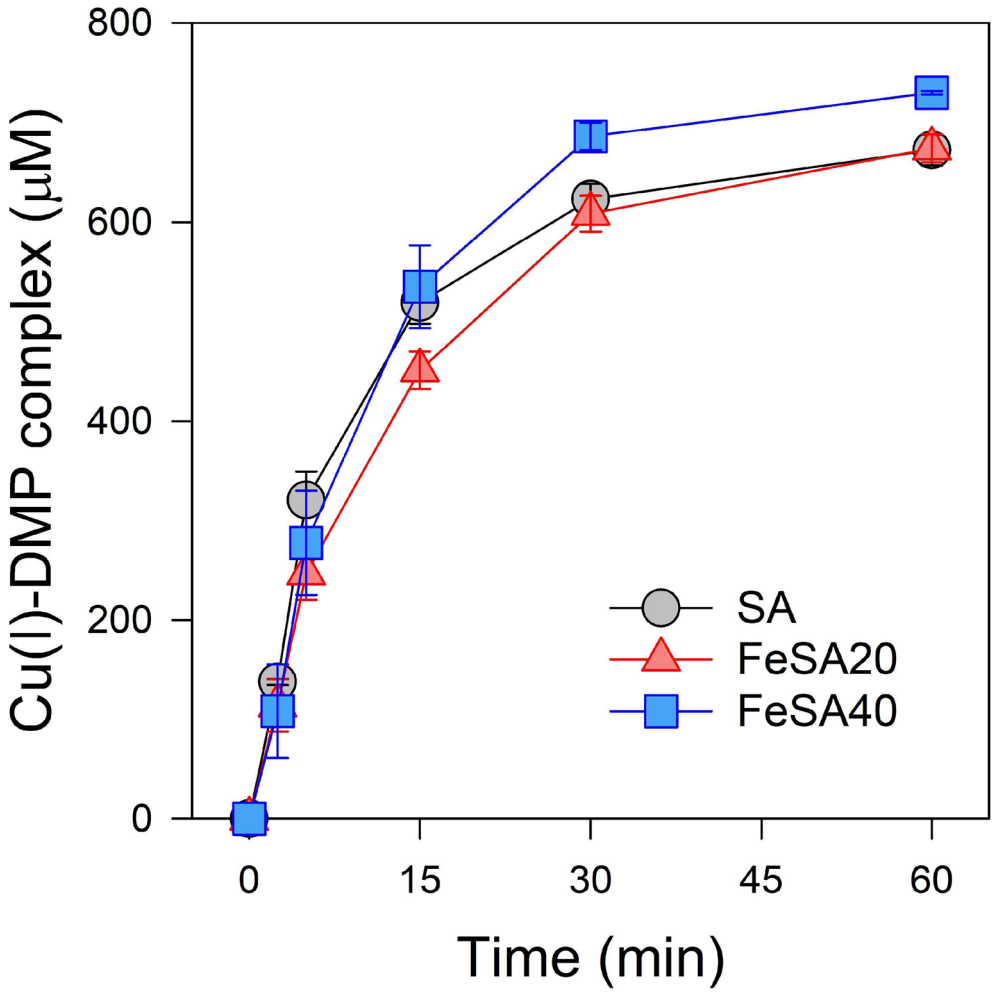


Figure S4. Temporal changes in Cu(I) concentration during Cu(II) reduction by SA, FeSA20, and FeSA40. Reaction conditions: $[Cu(II)]_0$ = 1 mM; $[DMP]_0$ = 4.8 mM; $[PBS]_0$ = 10 mM; pH = 6.6; solid concentrations = 1 g/L.

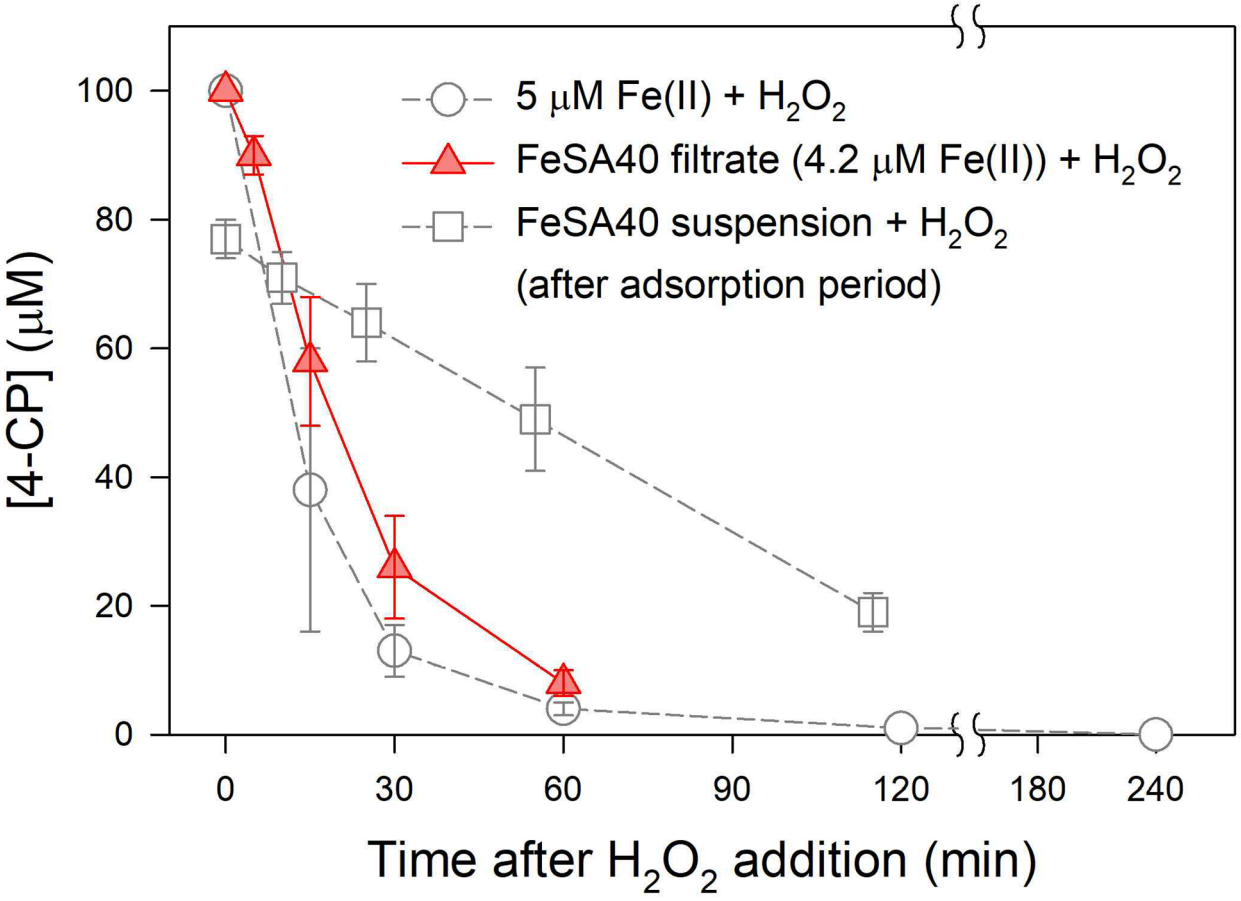


Figure S5. Time-dependent 4-CP removal in a homogeneous Fenton system containing 5 μM Fe(II), the FeSA40 filtrate, and the FeSA40 suspension at pH 4. Reaction conditions: initial $[4\text{-CP}]_0$ = 0.1 mM (before the adsorption period for the FeSA40 suspension); $[H_2O_2]_0$ = 10 mM; [FeSA40] = 1 g/L (where applicable).

Description: The FeSA40 filtrate was prepared by equilibrating FeSA40 (1 g/L) in pH-adjusted DI water (pH 4) for 1 h, followed by filtration through a 0.45 μm membrane filter. The recovered filtrate contained 4.20 μM total dissolved Fe, predominantly as Fe(II) (4.18 μM). For comparison, a separate Fe-leaching experiment conducted under similar conditions without 4-CP showed 3.8 ± 4.3 μM Fe(II) and 5.1 ± 2.1 μM total dissolved Fe after 60 min (Figure 4c). For the FeSA40 suspension, H_2O_2 was added after a 60-min adsorption period, during which the 4-CP concentration decreased from 100 to ~77 μM. The data for the homogeneous Fenton system and the FeSA40 suspension were taken from Figures 5a and 3a, respectively.