

Supporting Information

Conversion of Xylose to Furfural over Lignin-Based Activated Carbon-Supported Iron Catalysts

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Table S1. Metal analysis from ACs by ICP-OES.

Sample	Zn	Fe	Ca	K	Mn	S	Na	Mg
	/wt%	/wt%	/wt%	/wt%	/wt%	/wt%	/wt%	/wt%
ACs	0.01	0.06	0.47	0.09	0.02	< 0.1	0.57	0.05

Table S2. XPS results of ACs, 5-Fe-ACs and 10Fe-ACs.

Sample	BE (eV) ^a	ACs % ^b	5Fe-ACs % ^b	10Fe-ACs % ^b
Total C-%	From C1s	96.8	93.7	86.2
C-C (sp ³)	(284.8 eV)	55.3	51.5	42.1
C-O	(285.5 eV)	21.4	21.3	25.9
C=O	(287.0 eV)	7.4	10.6	8.0
COOH/ COOR	(288.5 eV)	5.7	3.8	4.2
π - π^* satellite	(290.5 eV)	7.0	6.5	6.0
Total O-%	From O1s	3.0	4.1	9.6
O= / Fe ₂ O ₃	(531.0 eV)	0.3	0.9	4.8
O-	(532.5 eV)	1.3	2.1	3.2
O-C=O	(534.0 eV)	0.9	0.7	1.2
H ₂ O (ads.)	(535.5 eV)	0.5	0.4	0.4
Total Cl-%	(198.4 eV)	nd.	1.5	1.6
Total Fe-%	(711.3 eV)	nd.	0.6	2.4

^a binding energy \pm 0.3 eV

^b % is the relative amount from atom percent of the total sample

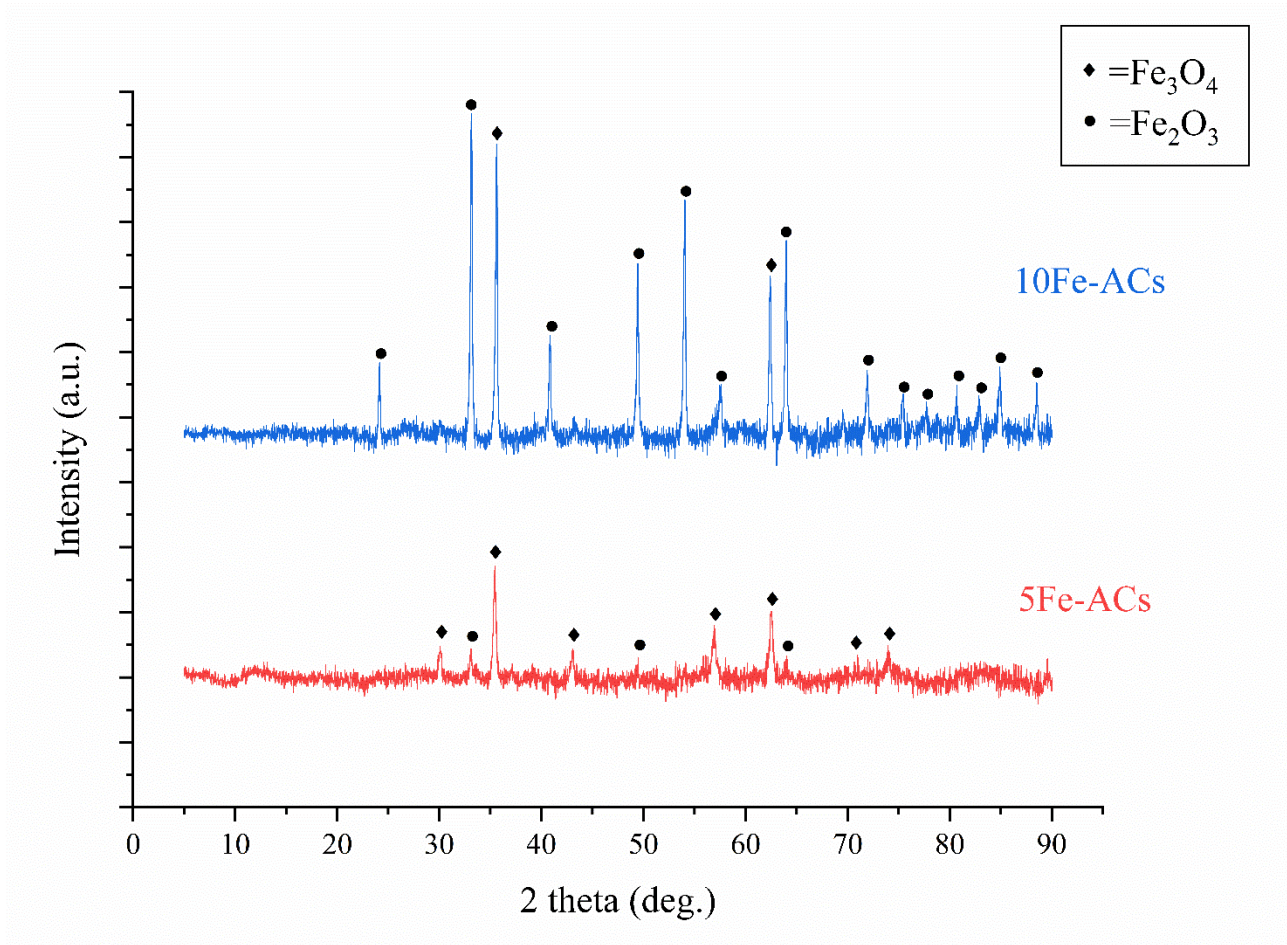


Figure S1. XRD results of 5Fe-ACs and 10Fe-ACs.

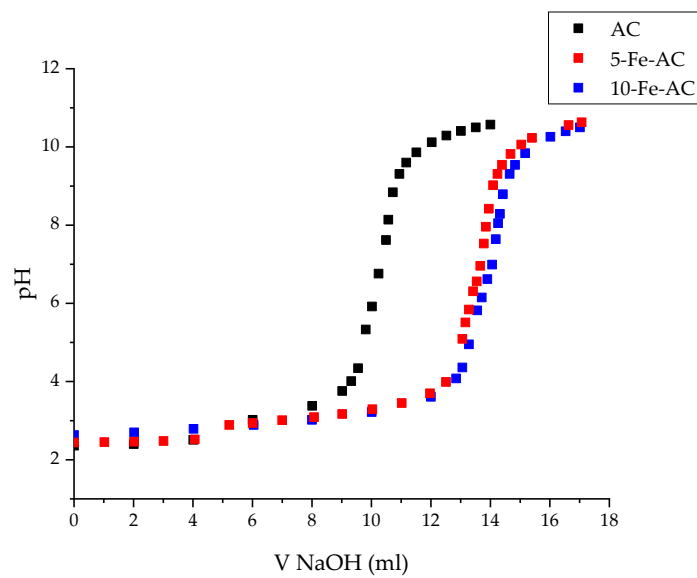


Figure S2. Boehm titration curves.

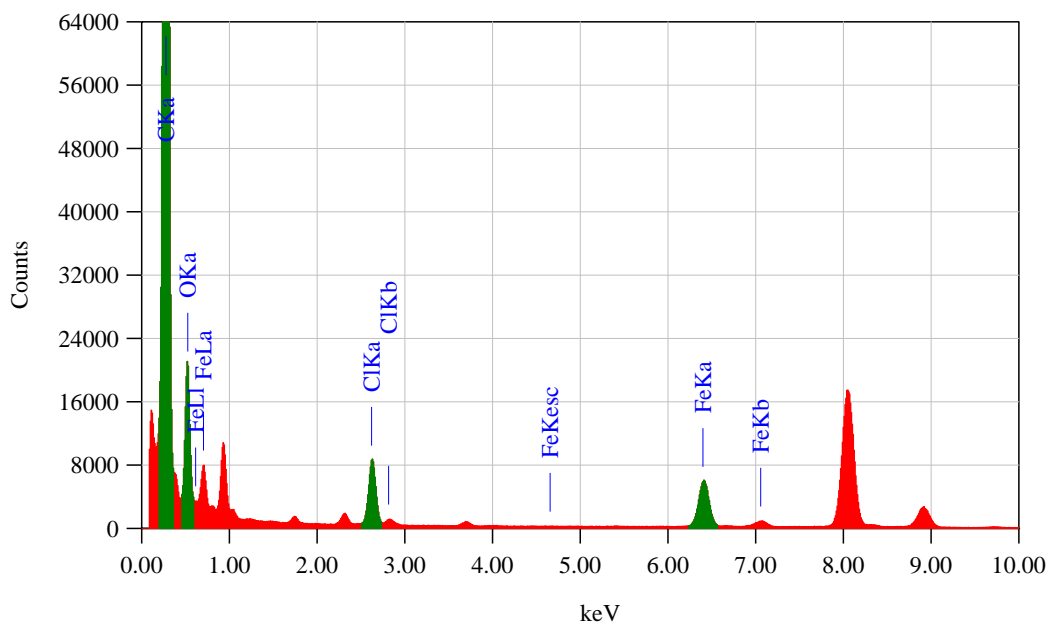


Figure S3. EDS spectra of area shown in figure 4.

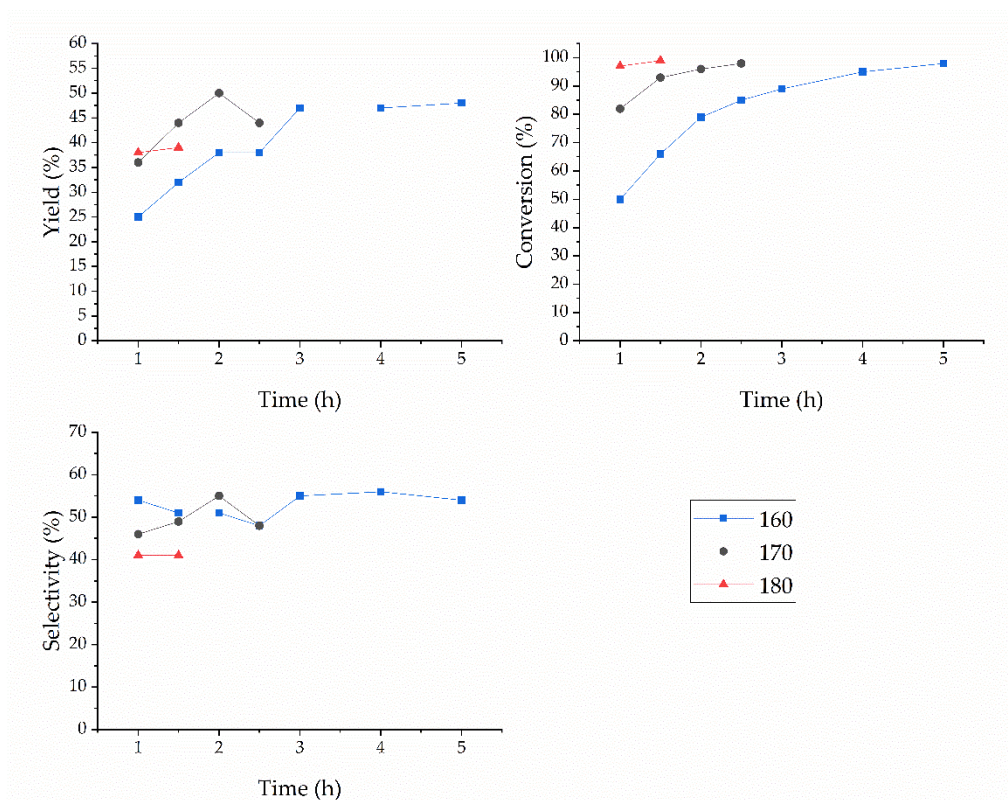


Figure S4. Graphical presentation of the results presented in table 5.

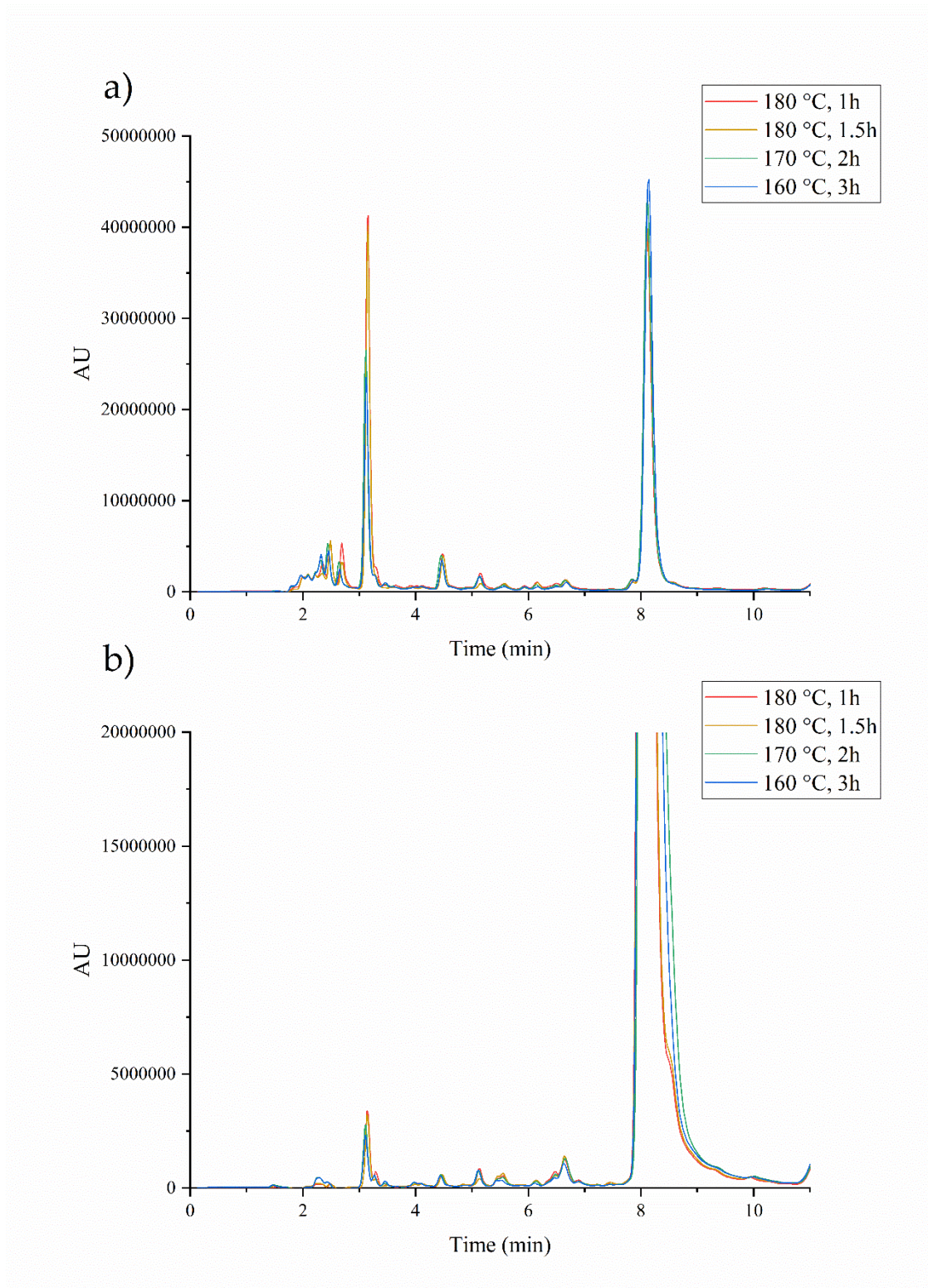


Figure S5. HPLC chromatogram of water (a) and organic (b) phase of reaction solution using 5Fe-ACz catalyst. Grams show increasing side product peak at 3.1 min and formation of furfural shoulder at 8.5 min, when 180 °C was used as reaction temperature.

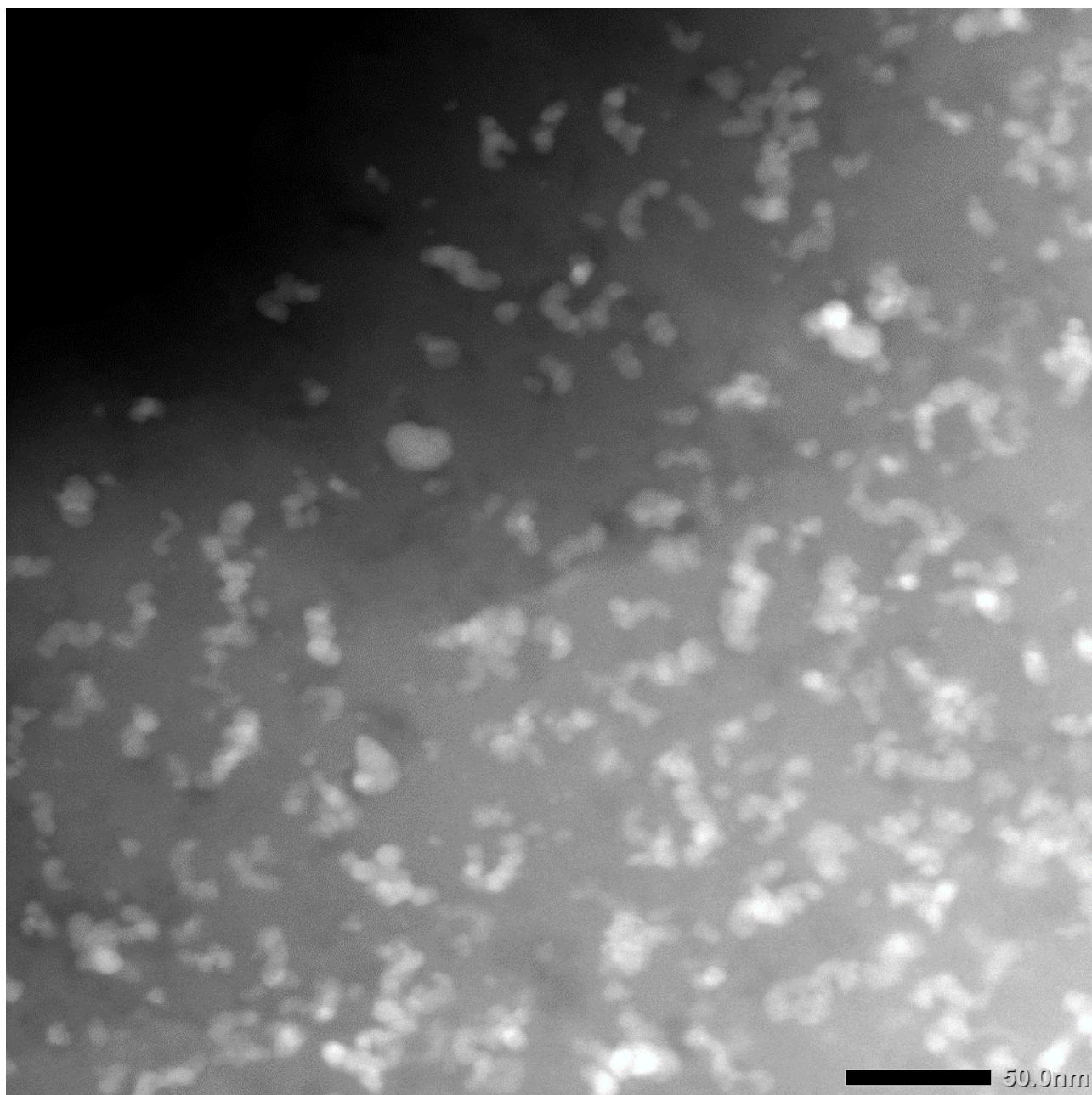
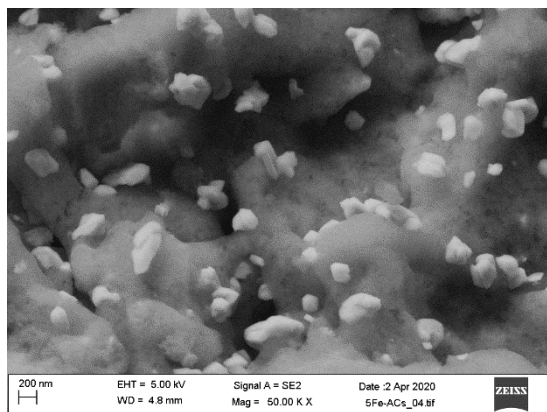
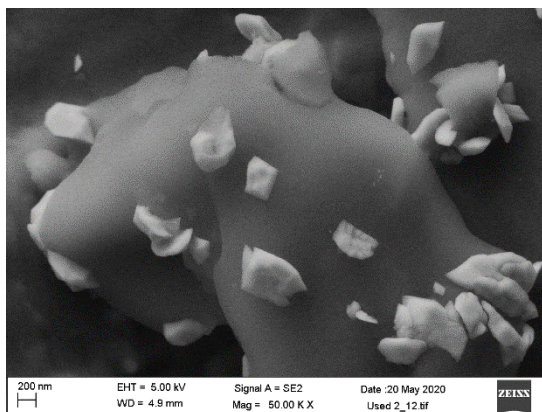


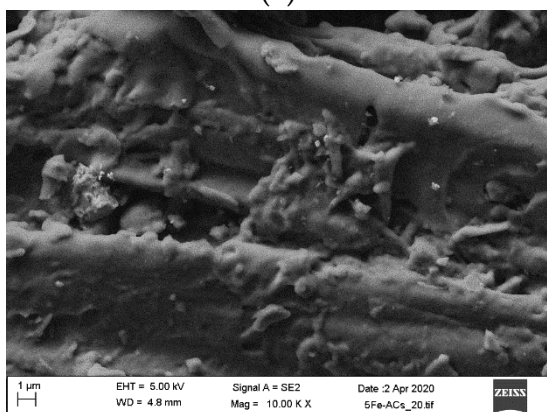
Figure S6. STEM HAADF image of three times used 5Fe-ACs, which shows large agglomerated iron particles (diameter approx. 15-40 nm) as well as small single particles (diameter approx. 5 nm).



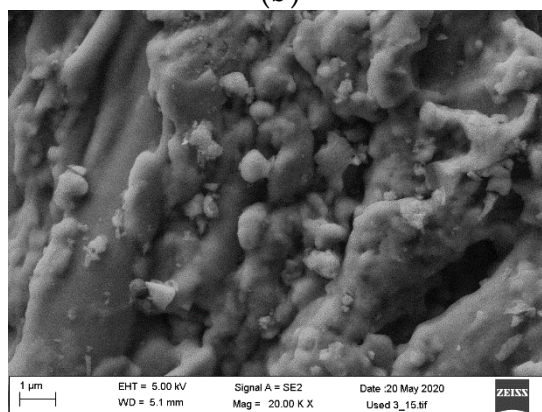
(a)



(b)



(c)



(d)

Figure S7. SEM images of unused 5Fe-ACs (a,c), and used 5Fe-ACs (b,d) catalysts.