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# Supplementary Materials

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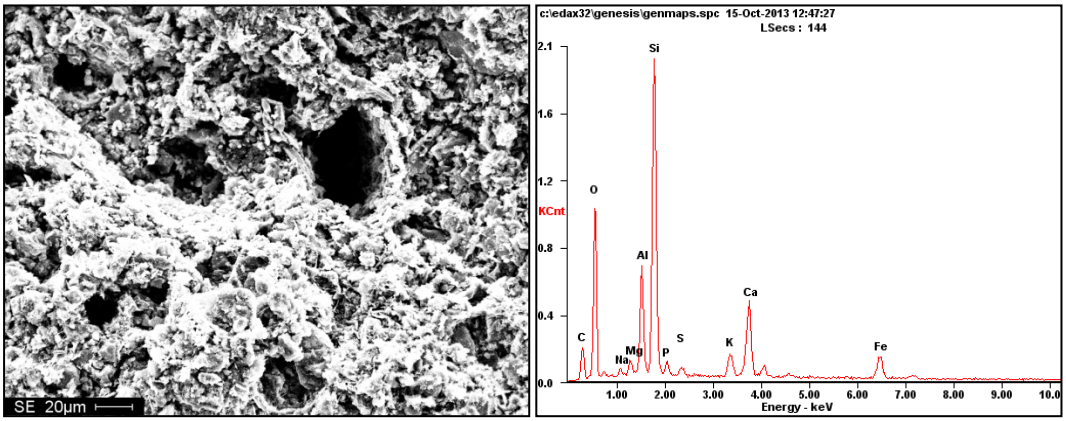
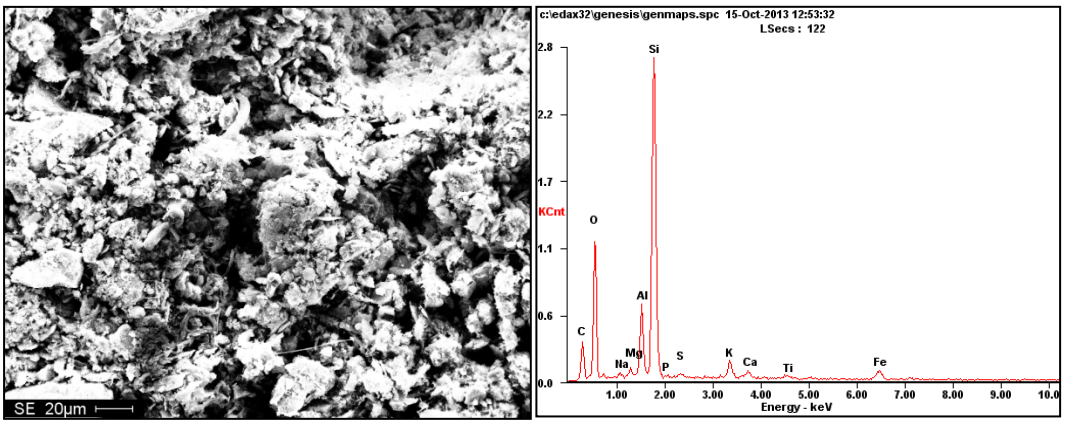
1. SEM and EDAX




(a) SW




(b) $HNO_3$-SW

Fig.S1 SEM and EDAX spectrum of SW (a) and $HNO_3$-SW(b).

2. Specific surface area and pore distribution

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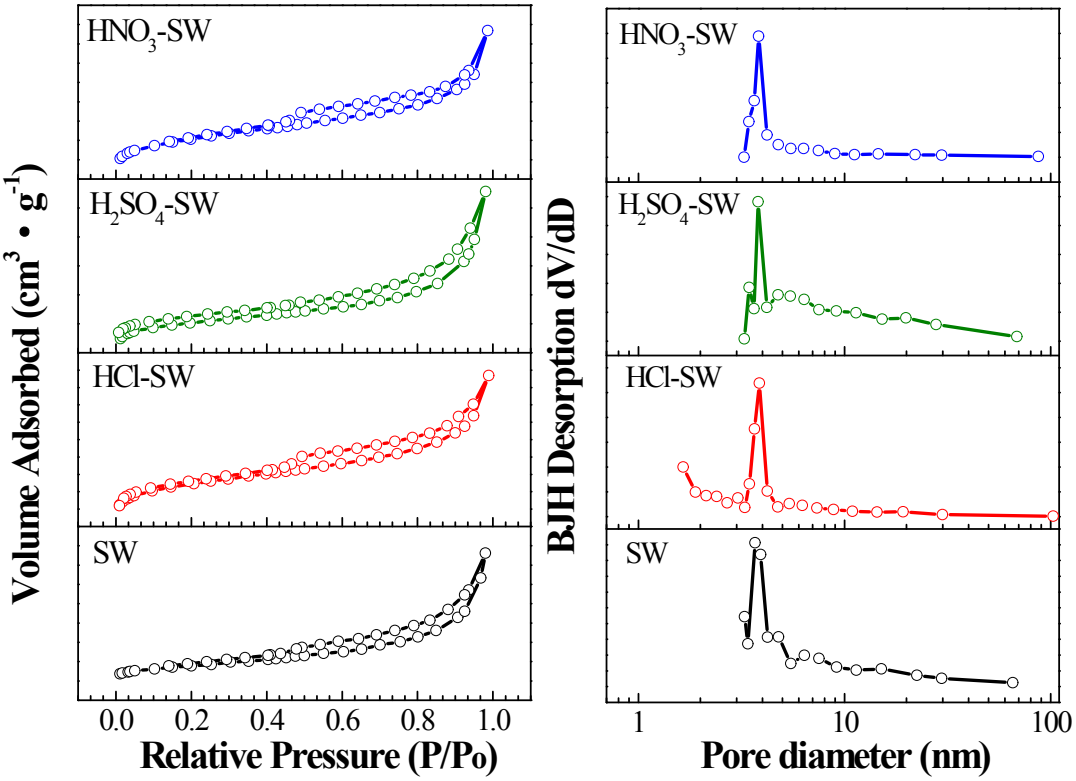


Fig.S2 Nitrogen adsorption/desorption isotherms and pore distribution of SWs.

3. GC/MS and HRMS

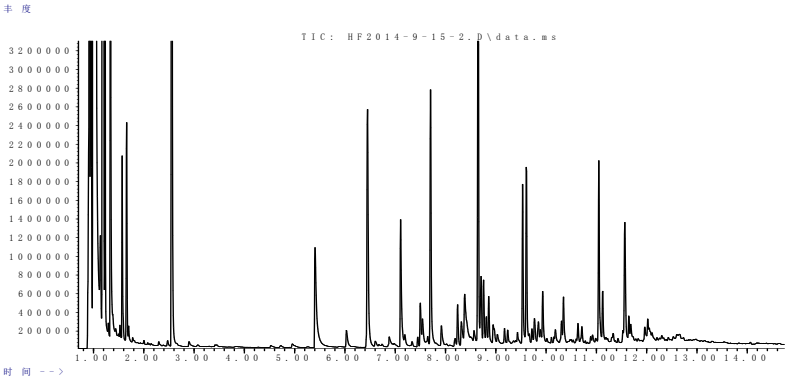


Fig.S3 GC/MS spectrum of m-cresol degradation in CWPO by $HNO_3$-SW catalyst.

Table S1 Result of GC/MS and HRMS

| GC/MS | HRMS | Low molecular weight acids |
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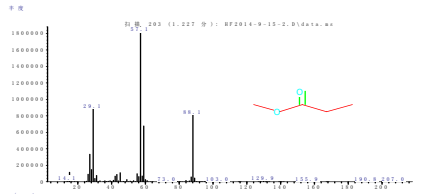
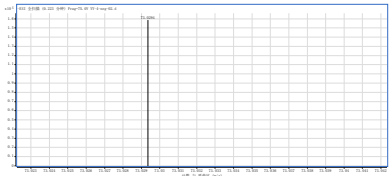
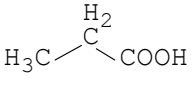
|  |  |  |

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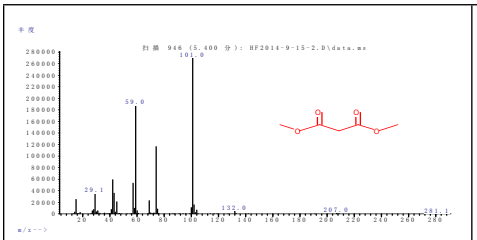
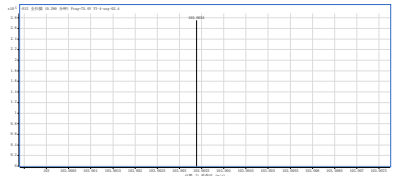
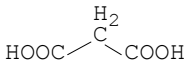
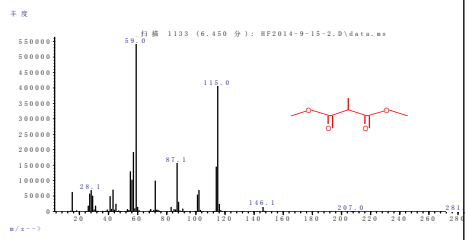
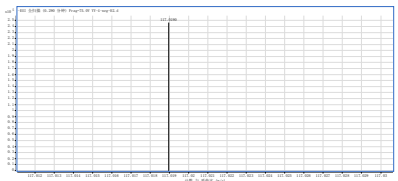
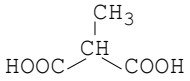
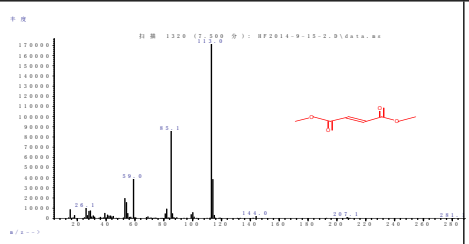
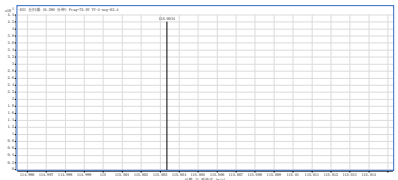
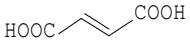
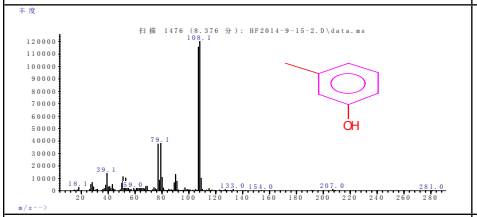
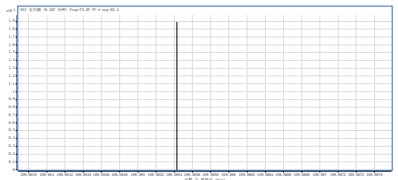
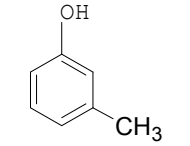
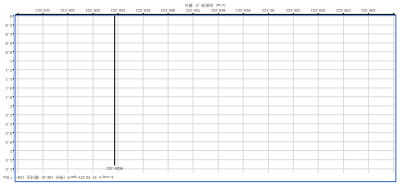
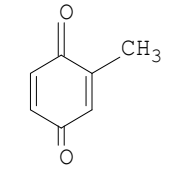
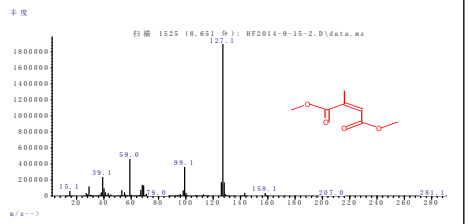
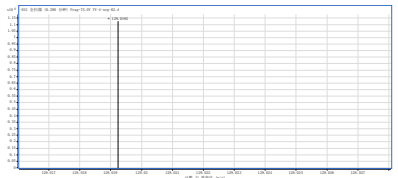
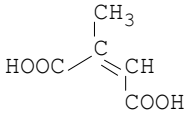
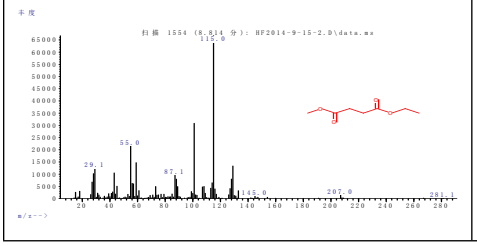
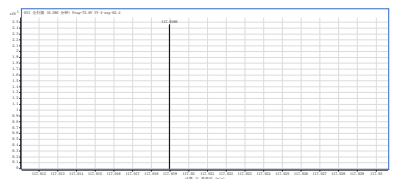
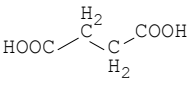
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
| -- |  |  |
|  |  |  |
|  |  |  |

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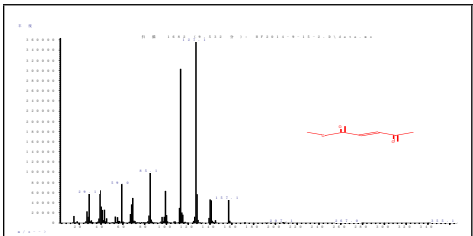
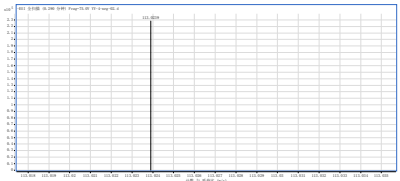
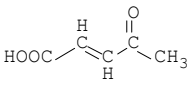
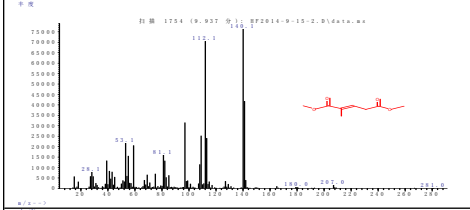
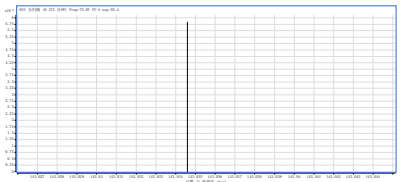
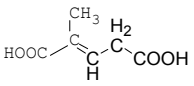
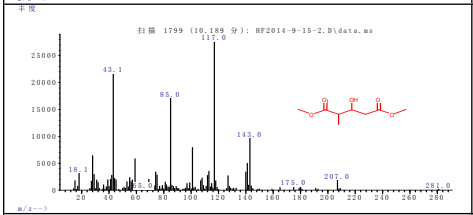
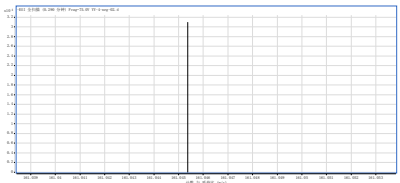
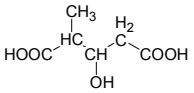
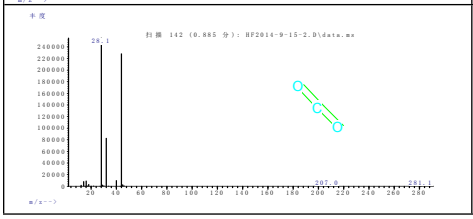
|  |  |  |
|  |  |  |
|  |  |  |
|  | -- | $CO_2$ |

4. Ion chromatogram

Ion chromatogram of the effluent by SWs was shown in Fig S4. The retention time of the peak before 3 min was monocarboxylic such as formic acid, acetic acid and propionic acid, while the retention time of the peak after 3 min was dicarboxylic acids. The result showed that more low molecular weight acids were generated by $HNO_3$-SW catalyst. It indicated that the catalytic activity of $HNO_3$-SW was better than SW.

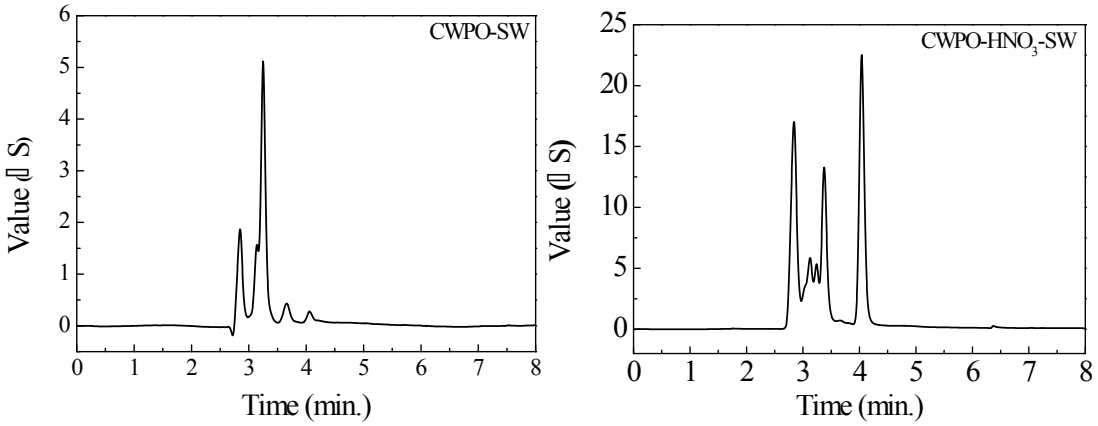



Fig.S4. Total ion chromatogram of the effluent by different SW catalysts：SW (a) and $HNO_3$-SW (b).

5. XRF

Table S2. XRF analysis of the four SW catalysts.

| Chemical composition | SW | HCl-SW | $H_2SO_4$-SW | $HNO_3$-SW |
|---|---|---|---|---|
| C | 13.80 | 10.33 | 16.22 | 12.29 |
| $SiO_2$ | 46.32 | 63.91 | 51.81 | 63.26 |
| $Al_2O_3$ | 15.23 | 15.49 | 17.55 | 14.61 |
| CaO | 9.69 | 0.55 | 1.89 | 1.04 |
| $Fe_2O_3$ | 5.06 | 1.68 | 3.92 | 2.39 |
| $K_2O$ | 1.80 | 2.21 | 1.99 | 1.98 |
| $P_2O_5$ | 2.06 | 0.35 | 1.73 | 0.35 |

6. Continuous adsorption experiment

The continuous adsorption experiment was carried out by $HNO_3$-SW catalyst without the addition of any hydrogen peroxide. The results were shown in Fig. S6. It took 29 hours to reach the adsorption equilibrium.

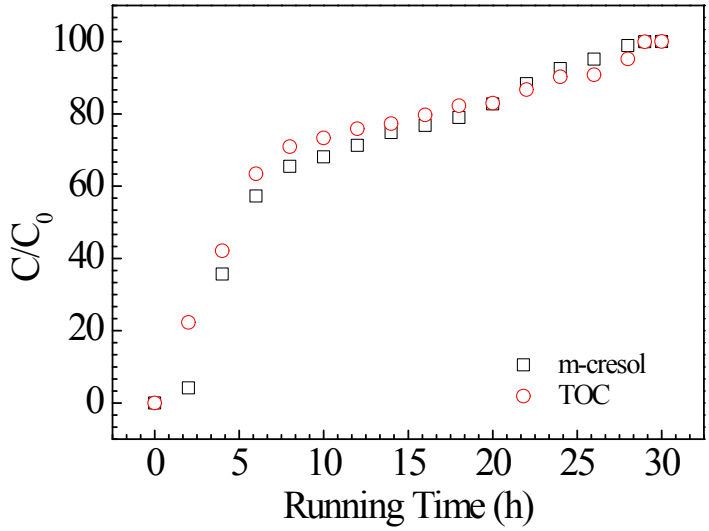



Fig.S6. Continusous adsorption experiment by $HNO_3$-SW.

7. BET

Table S3. BET surface area of SW catalysts

| Catalysts | $S_{BET}(N_2)$ | Total pore volume | Average pore diameter |
|---|---|---|---|
| | $m^2 \cdot g^{-1}$ | $cm^3 \cdot g^{-1}$ | nm |
| SW | 22.34 | 0.051 | 3.882 |
| HCl-SW | 80.74 | 0.083 | 3.860 |
| $H_2SO_4$-SW | 33.42 | 0.051 | 3.810 |
| $HNO_3$-SW | 52.94 | 0.049 | 3.826 |