

## Supplementary Information

### **Heterogeneous catalytic activation of peroxydisulfate toward degradation of pharmaceutical diclofenac and ibuprofen using scrap printed circuit board**

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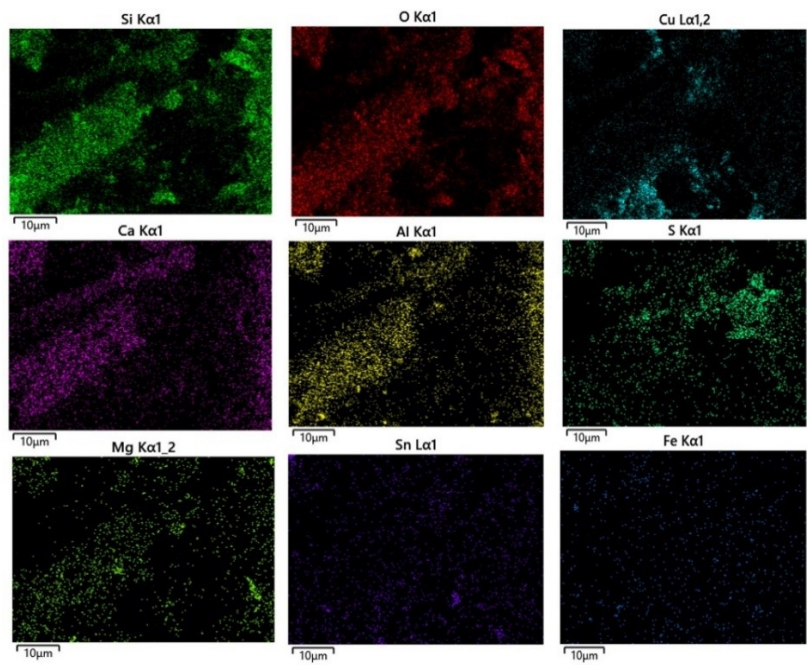
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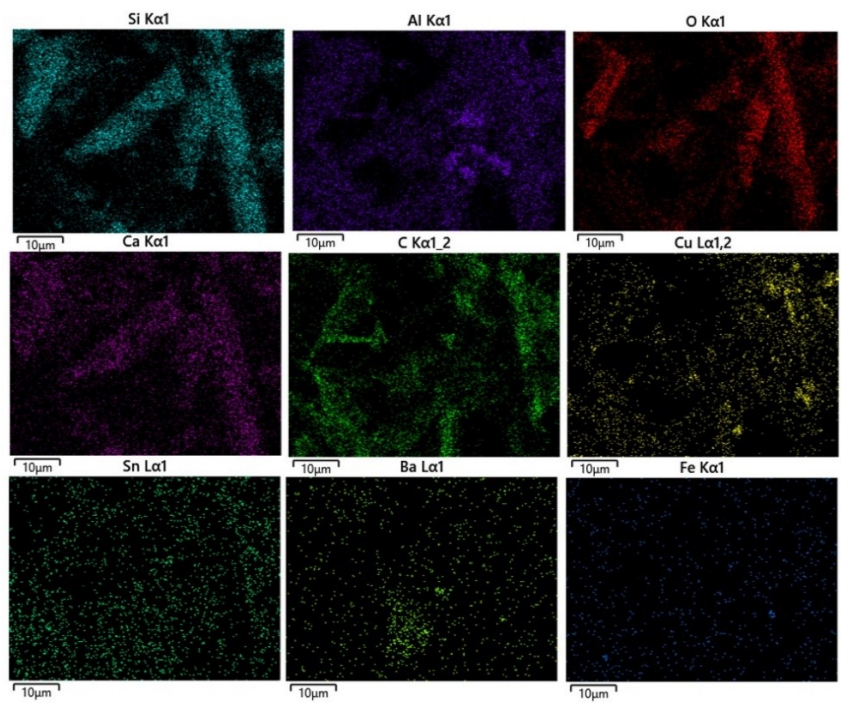
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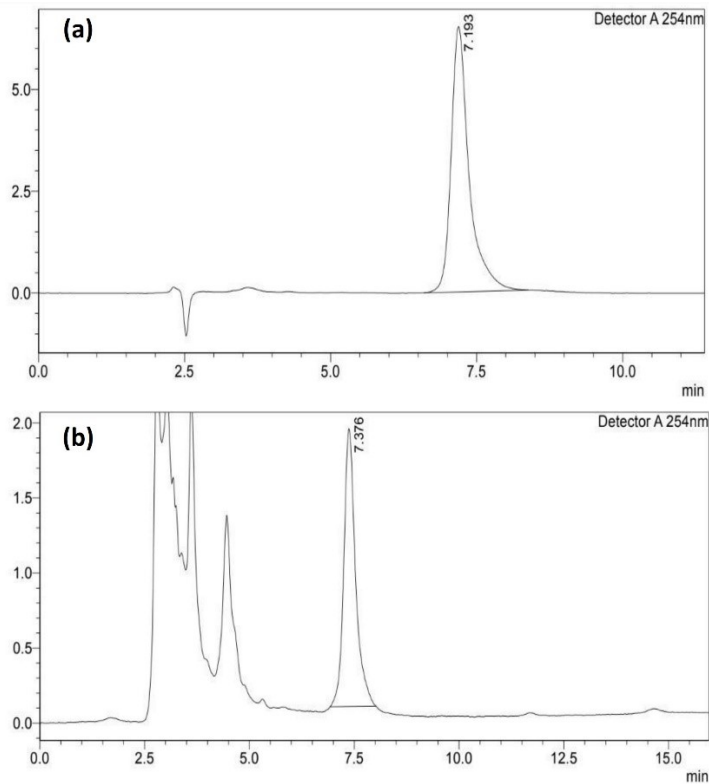
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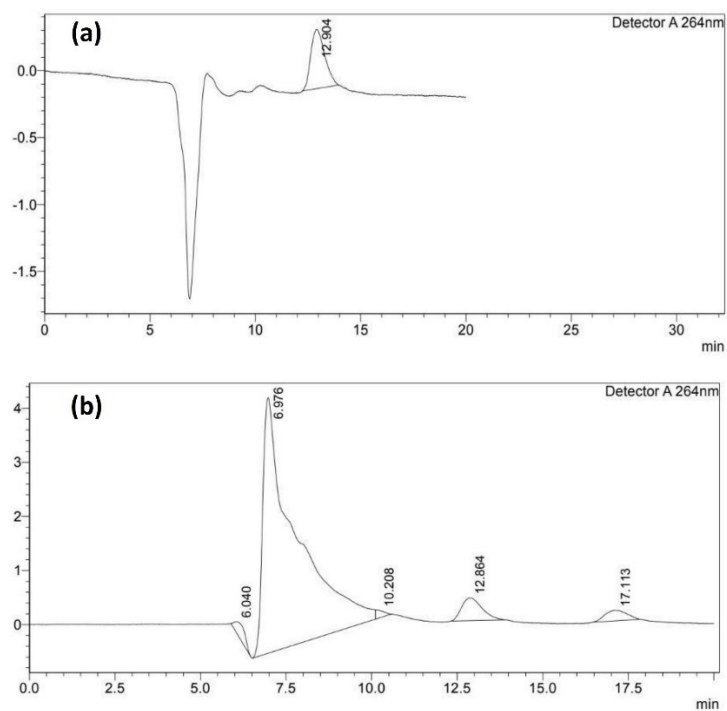
**Fig. S1. SEM-EDS elemental mapping of NCC**



**Fig. S2. SEM-EDS elemental mapping of CC**



**Fig. S3. Chromatogram of DCF, (a) before degradation (b) after degradation**



**Fig. S4. Chromatogram of IBP, (a) before degradation (b) after degradation**

**Table S1. The chemical composition of both catalysts is detailed in the XPS results.**

C-PCB			NC-PCB		
Element's symbol	Peak binding energy (eV)	Element's state	Element's symbol	Peak binding energy (eV)	Element's state
Br(3d)	69.08	CH <sub>3</sub> Br, organic Br, metal Br	Si(2p)	103.4	SiO <sub>2</sub> , metal SiO <sub>4</sub>
Si(2p)	103.2	SiO <sub>2</sub> , metal SiO <sub>4</sub>	S(2P)	169.74	CaSO <sub>4</sub> , metal SO <sub>4</sub> , metal SO <sub>3</sub> , organic SO <sub>2</sub>
C(1s)	285	C-C or C-H, carbonate	C(1S)	285.14	C-C or C-H, carbonate
Ca(2p)	348.55	CaCO <sub>3</sub> , CaO element	Ca(2p)	348.08	CaCO <sub>3</sub> , CaO element
Sn(3d)	487.06	SnO, SnO <sub>2</sub> element	Sn(3d)	486.89	SnO, SnO <sub>2</sub> element
O(1s)	532.31	SiO <sub>2</sub> , metal CO <sub>3</sub> , metal oxide	O(1S)	531.94	SiO <sub>2</sub> , metal CO <sub>3</sub> , metal oxide
Fe(2p)	716.02	Element	Fe(2p)	715.35	Fe <sub>2</sub> O <sub>3</sub> element
Co(2p)	781	CoO, Co <sub>2</sub> O <sub>3</sub> , Co <sub>3</sub> O <sub>4</sub> element	Co(2p)	780.89	CoO, Co <sub>2</sub> O <sub>3</sub> , Co <sub>3</sub> O <sub>4</sub> element
Cu(2p)	934.97	CuO element	Cu(2p)	934.4	CuO element
Mg(1s)	1305.05	MgO element	Mg(1s)	1304.72	MgO element
Metal oxide (CaO, Co <sub>2</sub> O <sub>3</sub> , Co <sub>3</sub> O <sub>4</sub> , CoO, SnO, CuO, Cu <sub>2</sub> O, MgO)			Metal oxide (CaO, Co <sub>2</sub> O <sub>3</sub> , Co <sub>3</sub> O <sub>4</sub> , CoO, SnO, CuO, Cu <sub>2</sub> O, MgO, Fe <sub>2</sub> O <sub>3</sub> )		
Elemental (Fe, Sn, Co, Mg, Cu)			Elemental (Fe, Sn, Co, Mg, Cu)		

**Table S2: Leaching metal ions from catalysts in the treated solution**

Time(min)	Fe(ppm)	Ba(ppm)	Ag(ppm)	Al(ppm)	Cr(ppm)	N(ppm)	Zn(ppm)
0	0	0	0	0	0	0	0
5	L.D	0.479	L.D	L.D	L.D	L.D	L.D
15	L.D	0.627	L.D	L.D	L.D	L.D	L.D
25	0.0215	0.712	L.D	L.D	L.D	L.D	L.D
40	0.142	0.825	L.D	L.D	L.D	L.D	L.D
55	0.266	0.952	L.D	L.D	L.D	L.D	L.D
70	0.492	1.02	L.D	L.D	L.D	L.D	L.D

## **Acknowledgments**

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## **Conflicts of Interest**

The authors declare no conflict of interest.