

## Supplementary Material for

# Enhanced and Sustainable Removal of Indoor Formaldehyde by Naturally Porous Bamboo Activated Carbon Supported with MnO<sub>x</sub>: Synergistic Effect of Adsorption and Oxidation

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The supplementary material contains 5 pages, including Tables S1-S4, and Figures

S1-S2.

## 1. Supporting Tables

**Table S1.** The Mn contents of BAC@MnO<sub>x</sub>-N (N = 1, 2, 3, 4, 5) series of catalysts.

Samples	BAC@MnO <sub>x</sub> -1	BAC@MnO <sub>x</sub> -2	BAC@MnO <sub>x</sub> -3	BAC@MnO <sub>x</sub> -4	BAC@MnO <sub>x</sub> -5
Mn (wt.%)	7.72	8.98	10.24	10.44	11.04

**Table S2.** The integral areas values of D and G bands of BAC and series of catalysts.

Samples	<i>I<sub>D</sub></i>	<i>I<sub>G</sub></i>	<i>I<sub>D</sub>/I<sub>G</sub></i>
BAC	417829.2	171227.4	2.44
BAC@MnO <sub>x</sub> -1	147776.3	63541.4	2.33
BAC@MnO <sub>x</sub> -2	354249.7	148978.5	2.38
BAC@MnO <sub>x</sub> -3	71912.9	31094.2	2.31
BAC@MnO <sub>x</sub> -4	51459.5	21352.5	2.41
BAC@MnO <sub>x</sub> -5	107913.9	45252.3	2.38

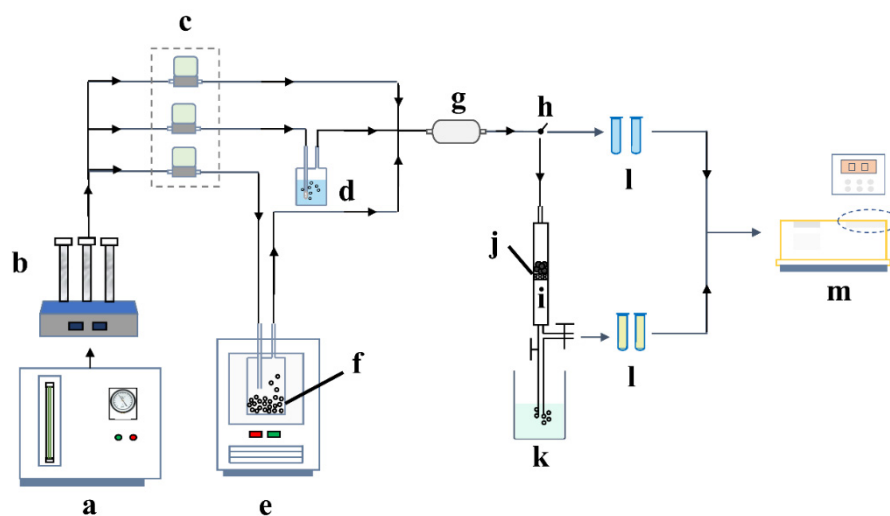
**Table S3.** Binding energy of C 1s, Mn 2p<sub>3/2</sub>, and O 1s of all catalysts.

Samples	Binding energy (eV)							
	C 1s			Mn 2p <sub>3/2</sub>			O 1s	
	sp <sup>2</sup> C=C	sp <sup>3</sup> C-C	C=O	Mn <sup>3+</sup>	Mn <sup>4+</sup>	O'	O <sub>ads</sub>	O <sub>latt</sub>
BAC@MnO <sub>x</sub> -1	284.8	285.3	288.1	642.1	643.6	533.5	531.9	530.1
BAC@MnO <sub>x</sub> -2	284.8	285.6	289.0	642.1	643.8	533.6	532.1	530.0
BAC@MnO <sub>x</sub> -3	284.8	285.3	288.3	642.2	643.9	533.4	531.7	530.0
BAC@MnO <sub>x</sub> -4	284.8	285.3	288.3	642.3	644.6	533.4	531.7	530.0
BAC@MnO <sub>x</sub> -5	284.8	285.3	288.3	642.3	644.2	533.4	531.6	530.0

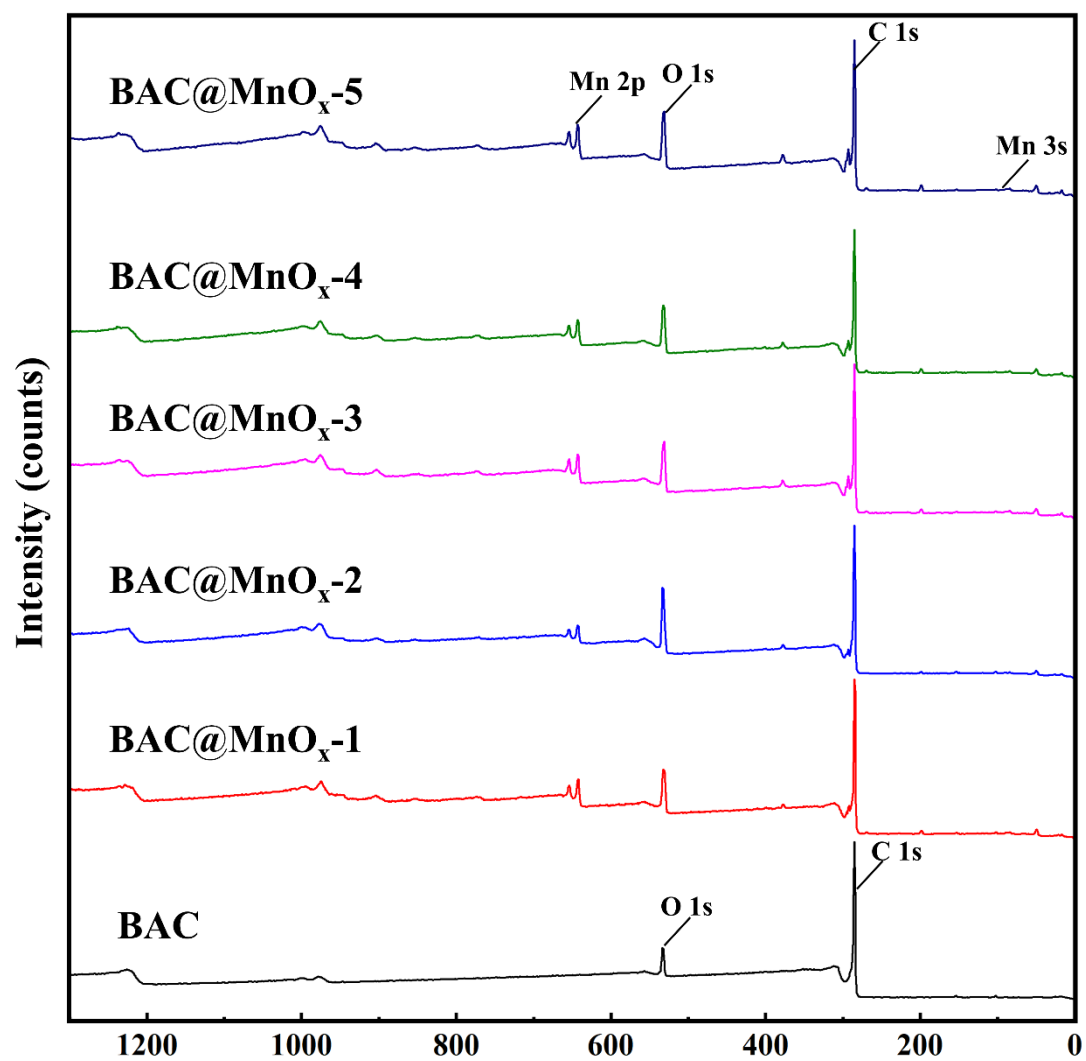
**Table S4.** Derived parameters for the Yoon-Nelson fitting of HCHO adsorption on BAC and all catalysts.

Samples	$C_0$ (mg·m <sup>-3</sup> )	$K_{YN}$ (min <sup>-1</sup> )	$\tau$ (h)	$\tau_{exp}$ (h)	$R^2$
BAC	1.439	1.518	2.608	2.703	0.993
BAC@MnO <sub>x</sub> -1	1.423	0.326	27.814	29.041	0.992
BAC@MnO <sub>x</sub> -2	1.415	0.116	47.298	51.802	0.995
BAC@MnO <sub>x</sub> -3	1.398	0.092	56.659	61.392	0.991
BAC@MnO <sub>x</sub> -4	1.407	0.088	62.558	67.568	0.990
BAC@MnO <sub>x</sub> -5	1.446	0.083	63.137	66.210	0.990

## 2. Supporting Figures



**Figure S1.** Schematic diagram of the dynamic test for HCHO adsorption: a. air compressor; b. gas dryer; c. mass flowmeter; d. bubbler (humid air); e. water bath; f. bubbler (HCHO vapor); g. gas mixing chamber; h. three-way valve; i. samples; j. quartz tube; k. tail gas treatment; l. gas gathering system; m. spectrophotometer instrument.



**Figure S2.** XPS spectra of full survey of BAC and series of catalysts.