Supporting information

Controlled preparation of multiply mesoporous CoAl-LDHs nanosheet for high performance of NO_x detection at room temperature

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Table S1. Gas sensing properties of CA2-1 sample compared with the references based on LDHs materials.

Gas sensors	Operation temperature (°C)	Gas (concentration)	Response (R_a/R_g)	Response/ recovery time	Stability (day)	References
$ZnO/ZnFe_2O_4$ composites	Room temperature	NO_x (100 ppm)	76%	1.3 s/--	35	17
PS@Co-LDH	200°C	Dimethyl sulfide (125 ppm);	3;	--/--	--	18
		Ethanol (4.3 ppm)	2.48	--/--	--	
PANI/ZnTi-LDHs	Room temperature	NH_3 (50ppm)	39.52	3/110s	--	19
Chlorine intercalated LDH	Room temperature	CO	0.04	--/--	--	20
		CO_2	0.1			
		NO	0.13			
		NO_2	0.11			
		CH_4 (125 ppm)	0.17			
NZAO	Room temperature	NO_x (100 ppm)	9.16	6/26 s	350	21
NCDH-20	Room temperature	NO_x (97 ppm-	70%	0.6 s/--	--	22
		0.97ppm)	6%	10 s/--		
hierarchical α-$Ni(OH)_2$ flower-like architectures	Room temperature	NO_x (97 ppm)	32.5%	13 s/--	35	23
MgAl-LDHs	Room temperature	NO_x (100 ppm)	76%	1.3 s/--	35	24
CoAl-LDHs	Room temperature	NO_x (100 ppm-	17.09	4.27/38.93s	60	Our work
		0.01ppm)	1.19	1.07/46.6s		

Table S2. The response, response time and recovery time results of CoAl-LDHs sensors (Co : Al = 2 : 1, hydrothermal time was 6 h) under the different NO_x concentrations at room temperature.

Sample		**CA-60**			**CA2-1**			**CA-120**	
NO_x (ppm)	Res.	T_{R1} /s	T_{R2} /s	Res.	T_{R1} /s	T_{R2} /s	Res.	T_{R1} /s	T_{R2} /s
100	3.54	7.63	41.32	17.09	4.27	38.93	2.78	4.53	58.76
50	3.27	5.26	42.04	14.53	5.33	39.07	2.56	5.27	62.57
30	3.15	7.38	41.37	10.98	5.33	34.13	2.07	8.23	65.32
10	1.67	2.96	36.07	5.17	5.87	38.93	1.83	4.32	69.31
5	1.52	2.34	38.75	4.36	7.47	35.20	1.69	4.15	54.02
3	1.38	1.98	31.85	3.17	7.47	47.20	1.54	5.87	53.18
1	1.17	1.65	42.38	2.66	11.20	31.47	1.36	5.96	61.08
0.5				2.29	16.33	49.80	1.30	5.69	59.03
0.3				2.04	17.07	46.40	1.21	4.20	60.68
0.1				1.89	6.93	53.27	1.15	4.76	58.37
0.05				1.60	9.60	49.07			
0.03				1.34	5.33	51.53			
0.01				1.19	1.07	46.40			

***Res.: Response T_{R1} : Response time T_{R2} : Recovery time**

CA-60 : Hydrothermally heated at 60℃ for 6 h

CA2-1 : Hydrothermally heated at 90℃ for 6 h

CA-120 : Hydrothermally heated at 120℃ for 6 h

Table S3. The response, response time and recovery time results of CoAl-LDHs sensors (Co : Al = 2 : 1, hydrothermal temperature was 90℃) under the different NO_x concentrations at room temperature.

Sample		**CA-3**			**CA2-1**			**CA-9**	
NO_x (ppm)	Res.	T_{R1} /s	T_{R2} /s	Res.	T_{R1} /s	T_{R2} /s	Res.	T_{R1} /s	T_{R2} /s
100	1.64	4.79	38.42	17.09	4.27	38.93	5.68	6.89	48.75
50	1.57	4.62	37.05	14.53	5.33	39.07	5.37	6.37	52.57
30	1.35	5.38	32.77	10.98	5.33	34.13	3.89	8.51	63.24
10	1.27	5.07	31.20	5.17	5.87	38.93	2.07	7.85	60.18
5	1.24	5.36	42.85	4.36	7.47	35.20	1.93	6.14	56.03
3	1.19	4.01	41.85	3.17	7.47	47.20	1.74	7.58	59.17
1	1.13	4.28	31.59	2.66	11.20	31.47	1.12	6.82	4.09
0.5				2.29	16.33	49.80			
0.3				2.04	17.07	46.40			
0.1				1.89	6.93	53.27			
0.05				1.60	9.60	49.07			
0.03				1.34	5.33	51.53			
0.01				1.19	1.07	46.40			

***Res.: Response T_{R1} : Response time T_{R2} : Recovery time**

CA-3 : Hydrothermally heated at 90℃ for 3 h

CA2-1 : Hydrothermally heated at 90℃ for 6 h

CA-9 : Hydrothermally heated at 90℃ for 9 h

(Revised Supporting information, table S2 and S3, page S3-S4)

Table S4. The response, response time and recovery time results of CoAl-LDHs sensors (different mole ratio, hydrothermally heated at 90 ℃ for 6 h) under the different NO_x concentrations at room temperature.

Sample		**CA3-1**			**CA2-1**			**CA1-1**	
NO_x (ppm)	Res.	T_{R1} /s	T_{R2} /s	Res.	T_{R1} /s	T_{R2} /s	Res.	T_{R1} /s	T_{R2} /s
100	4.29	7.46	66.25	17.09	4.27	38.93	7.12	6.98	59.51
50	4.14	8.26	57.62	14.53	5.33	39.07	6.73	7.73	60.75
30	3.60	8.53	62.73	10.98	5.33	34.13	6.29	8.35	62.41
10	2.07	7.50	61.20	5.17	5.87	38.93	2.78	7.82	57.32
5	1.96	8.63	62.58	4.36	7.47	35.20	2.39	6.49	58.20
3	1.72	8.40	71.18	3.17	7.47	47.20	2.17	6.87	63.70
1	1.62	7.82	67.95	2.66	11.20	31.47	1.78	6.95	61.07
0.5	1.54	7.31	68.95	2.29	16.33	49.80	1.58	8.40	57.98
0.3	1.37	7.84	63.20	2.04	17.07	46.40	1.47	8.17	56.31
0.1	1.12	7.28	67.71	1.89	6.93	53.27	1.19	7.62	56.54
0.05				1.60	9.60	49.07			
0.03				1.34	5.33	51.53			
0.01				1.19	1.07	46.40			

***Res.: Response T_{R1} : Response time T_{R2} : Recovery time**

CA3-1 : The molar ratio of Co : Al = 3 : 1

CA2-1 : The molar ratio of Co : Al = 2 : 1

CA1-1 : The molar ratio of Co : Al = 1 : 1

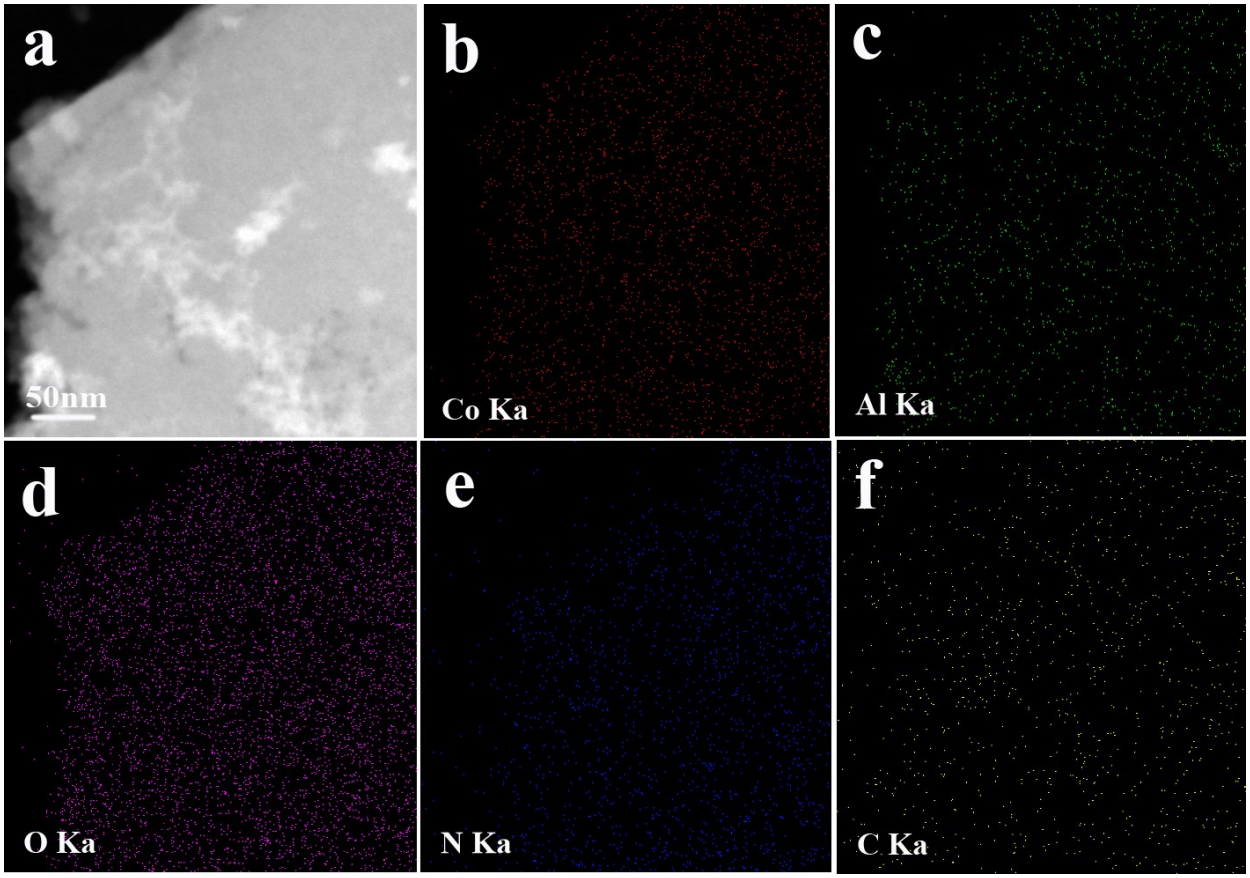

Fig. S1. Mapping of CA2-1 sample.

Fig. S1. showed that the Mapping of CA2-1 sample was composed of two-dimensional nanosheets. It could be seen from the bright image of Fig. S1.(b-f) that elements Co, Al and O were evenly distributed.

Table S5. O1s results of samples

Sample	Peak position (eV)	Peak area %
CA1-1	534.4	47.37
	530.8	52.63
CA2-1	534.5	57.09
	530.7	42.91
CA3-1	533.5	52.41
	530.8	47.59

Related References

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