Supporting Information

Expanded graphite/NiAl layered double hydroxide nanowires for ultra-sensitive, ultra-low detection limits and selective NO_x gas detection at room temperature

Xueying Zhang[a], Muhammad Ikram[a], Zhi Liu[a], Lei Teng[a], Jialing Xue[a], Di Wang[a], Li Li[a,b], Keying Shi*[a,c]*

[a] Key Laboratory of Functional Inorganic Material Chemistry, Ministry of Education, School of Chemistry and Material Science, Heilongjiang University, Harbin, 150080, P. R. China.

[b] Key Laboratory of Chemical Engineering Process＆Technology for High-efficiency Conversion, Heilongjiang University, Harbin, 150080, P. R. China.

[c] Key Laboratory for Photonic and Electronic, Ministry of Education, Modern Experiment Center, Harbin Normal University, Harbin 150025, P. R. China.

* Corresponding author

E-mail: shikeying2008@163.com; lili1993036@ hlju.edu.cn

Fax: +86 4518667 3647; Tel: +86 451 8660 9141

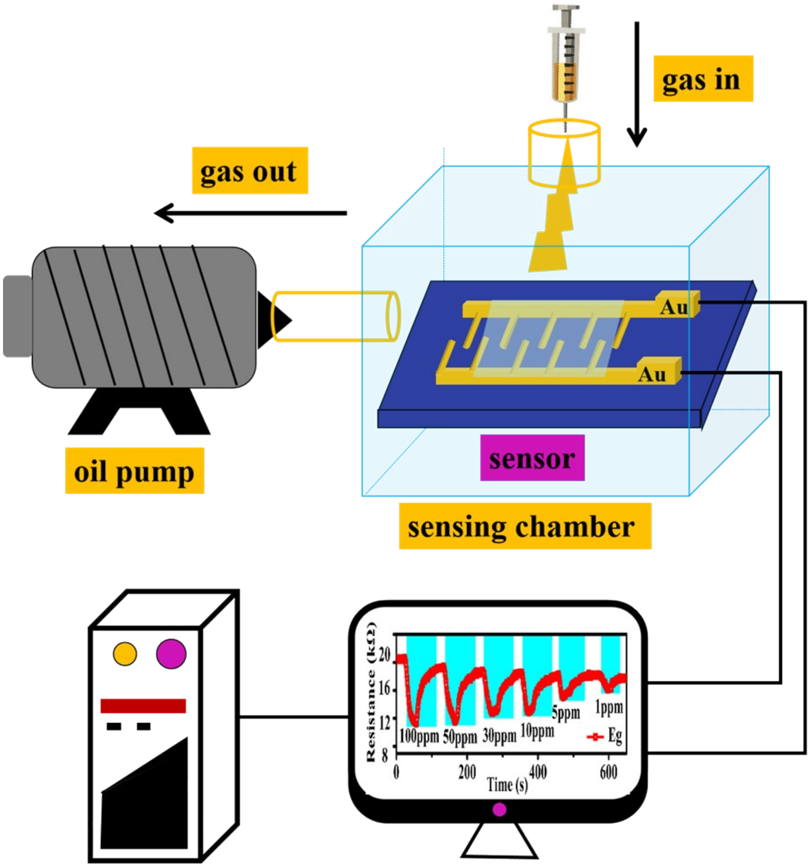

Fig. S1. Gas sensing tests of thin-film sensors.

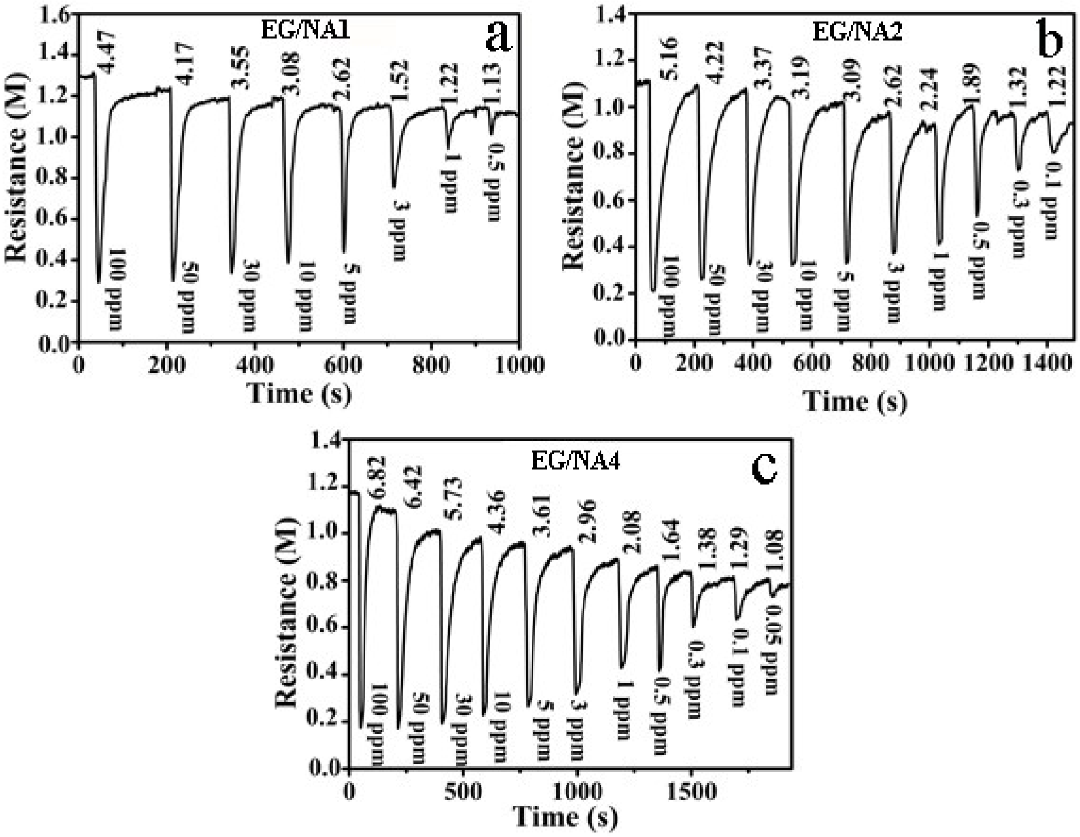

Fig. S2 Dynamical response-recovery curves of (a) EG/NA1, (b) EG/NA2, and (c) EG/NA4 towards NO_x at RT (24 ± 2 ℃).

Table S1 Response and response time of EG/NA samples to NO_x at RT (24 ± 2 ℃).

Sample	EG/NA1		EG/NA2		EG/NA3		EG/NA4	
NO_x (ppm)	R	T/s	R	T/s	R	T/s	R	T/s
100	4.47	6.0	5.16	5.3	17.65	2.0	6.82	8.6
50	4.17	6.6	4.22	5.6	13.43	4.6	6.42	9.3
30	3.55	7.3	3.37	6.0	8.99	4.6	5.73	9.3
10	3.08	7.3	3.19	4.6	5.71	4.0	4.36	8.0
5	2.62	8.0	3.09	7.3	4.32	6.0	3.61	8.6
3	1.52	7.3	2.62	8.0	3.36	6.6	2.96	9.0
1	1.22	6.6	2.24	7.3	2.23	5.3	2.08	8.6
0.5	1.13	6.6	1.89	6.0	1.84	5.3	1.64	9.3
0.3	--	--	1.32	6.0	1.63	3.3	1.38	10
0.1	--	--	1.22	5.3	1.56	4.0	1.29	8.0
0.05	--	--	--	--	1.51	5.3	1.08	7.3
0.03	--	--	--	--	1.39	5.3	--	--
0.01	--	--	--	--	1.27	6.0	--	--

R: Response; T: Response time.

Table S2 Response, response time and recovery time of EG, NiAl-LDH and EG/NA3 samples to NO_x at RT (24 ± 2 ℃).

Sample	EG			EG/NA3			NiAl-LDH		
NO_x (ppm)	R	T_1/s	T_2/s	R	T_1/s	T_2/s	R	T_1/s	T_2/s
100	2.44	7.3	13.3	17.65	2.0	9.3	3.42	9.3	14
50	2.19	7.3	14.6	13.43	4.6	10	3.03	8.0	15.3
30	2.01	8.6	14.6	8.99	4.6	10	2.69	7.3	15.3
10	1.53	8.6	13.3	5.58	4.0	10.3	1.97	6.0	13.3
5	1.42	6.0	10.6	4.14	6.0	12.6	1.80	7.3	13.6
3	1.16	6.3	10.6	3.29	6.6	14	1.64	6.0	12
1	--	--	--	2.23	5.3	14	1.37	6.6	9.6
0.5	--	--	--	1.76	5.3	12.6	--	--	--
0.3	--	--	--	1.56	3.3	10	--	--	--
0.1	--	--	--	1.45	4.0	10	--	--	--
0.05	--	--	--	1.37	5.3	9.6	--	--	--
0.03	--	--	--	1.28	5.3	9.6	--	--	--
0.01	--	--	--	1.18	6.0	8.3	--	--	--

R: Response; T_1: Response time; T_2: Recovery time.

Table S3 Carrier concentrations and fitted impedance parameters of EG, EG/NA3 and NiAl-LDH samples.

Samples	R_{Ω} (Ω)	C (F cm^{-2})	R_{ct} (Ω)
EG	409.2	4.56×10^{-6}	394.3
EG/NA3	1415	7.81×10^{-7}	975.5
NiAl-LDH	4294	2.01×10^{-6}	1931