Supplementary Materials

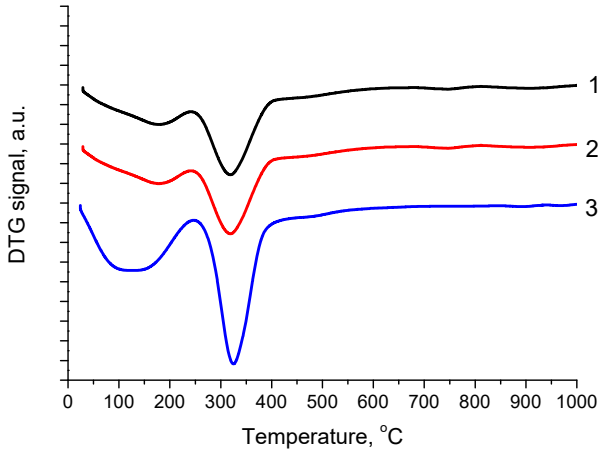

Figure S1. DTG profiles of NiAl-LDHs with the Ni:Al atomic ratio of 2 (line 1), 3 (line 2), and 4 (line 3) (thermal analysis in air).

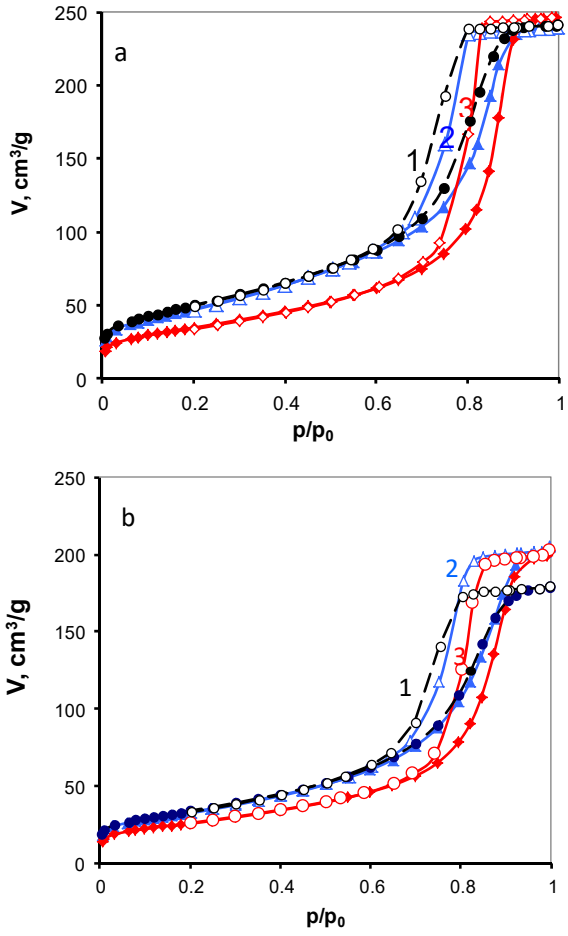

Figure S2. The adsorption-desorption isotherms for the samples with Ni:Al = 2 (a) and 4 (b). 1 –$NiAlO_x$ obtained by calcination of NiAl LDH at 600 °C; 2 – Ni@$NiAlO_x$ obtained

by calcination of NiAl LDH at 600 °C and subsequent reduction with H_2 at 500 °C; 3 – Ni@$NiAlO_x$ obtained by calcination of NiAl LDH at 600 °C and subsequent reduction with H_2 at 600 °C

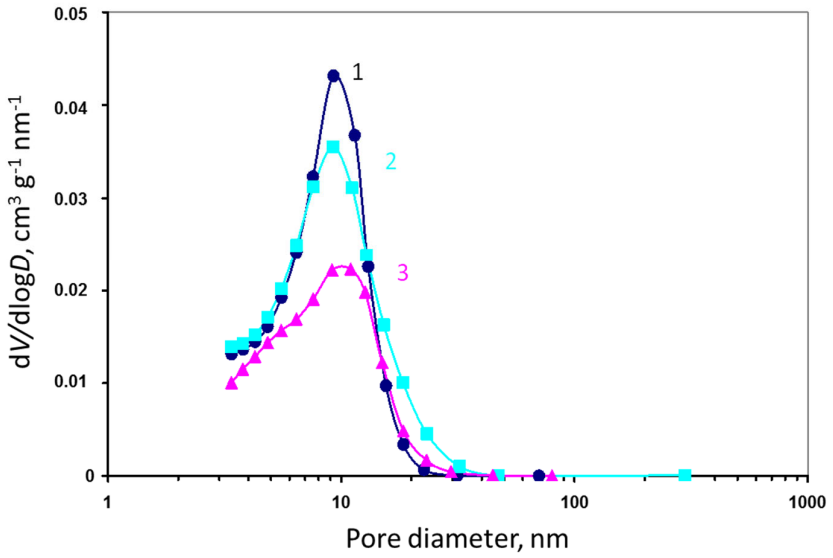

Figure S3. Pore size distribution curves calculated by the BJH method from the adsorption branch for $NiAlO_x$ samples obtained from NiAl LDHs with different Ni:Al atomic ratios: Ni:Al = 2 (1), Ni:Al = 3 (2), Ni:Al = 4 (3). All the samples were calcined at 600 °C.

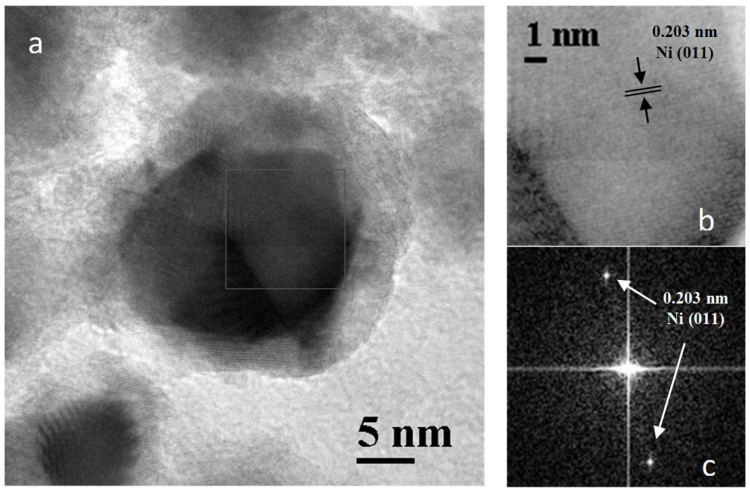

Figure S4. TEM image of a Ni/NiAlOx-4-600 sample reduced at 600°C (a); the area of the Ni nanoparticle is marked with a square (b); FFT obtained from the TEM image of the crystal lattice (c).

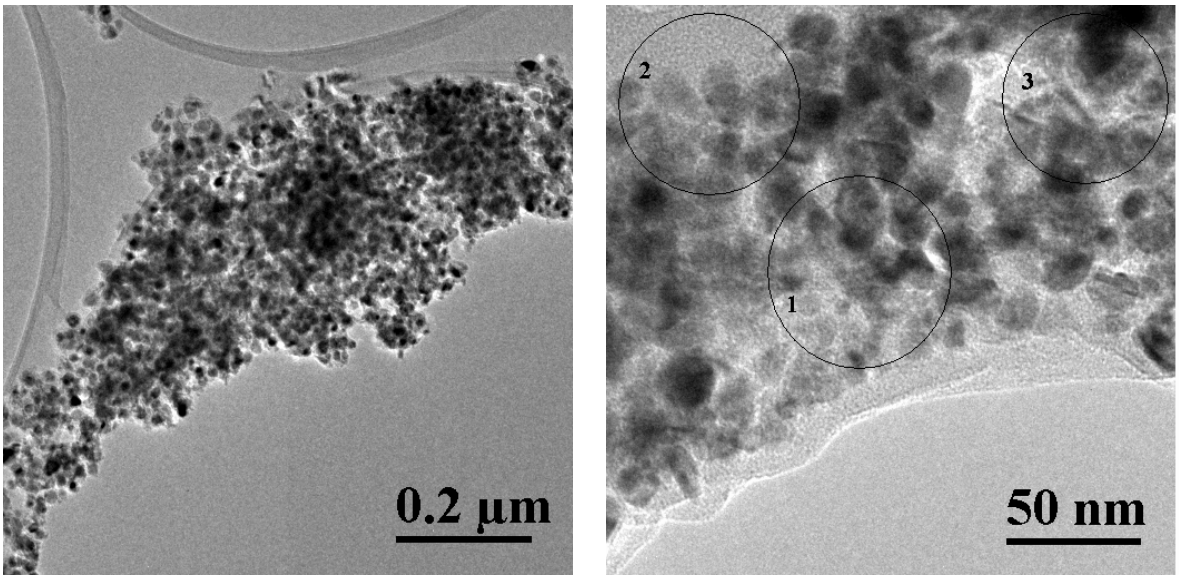

Figure S5. TEM images of the Ni@NiAlO$_x$-4-600 sample at various magnifications. The circles indicate the areas in which the EDX analysis was performed (the quantitative data for these areas are shown in Table S2).

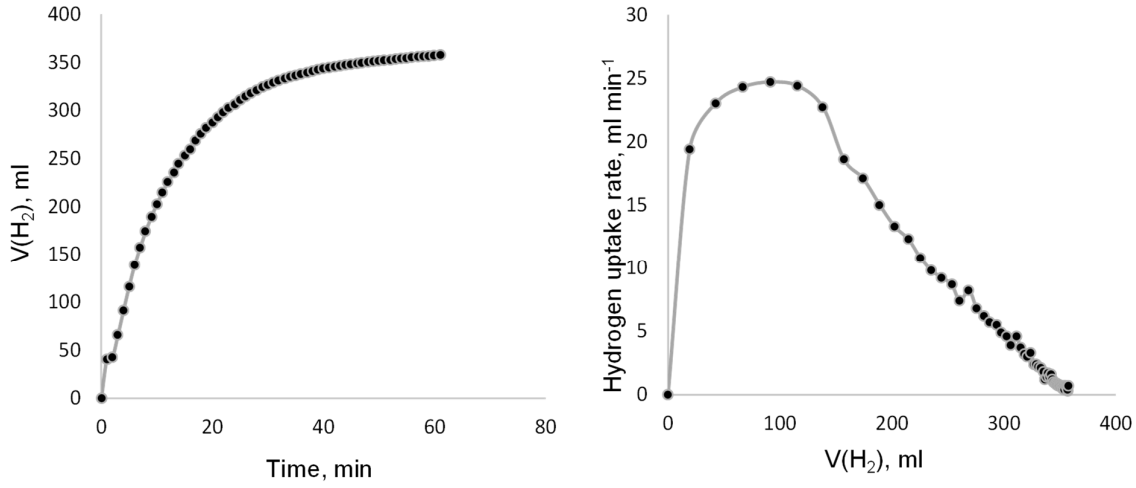

Figure S6. Hydrogen consumption curves *vs*. time (a) and hydrogen consumption rate *vs*. volume of hydrogen consumed (b) recorded during aqueous-phase hydrogenation of FAL (90 °C, 2.0 MPa) over 50%Ni/◎-Al_2O_3 preliminarily calcined at 600 °C and reduced at 600 °C.

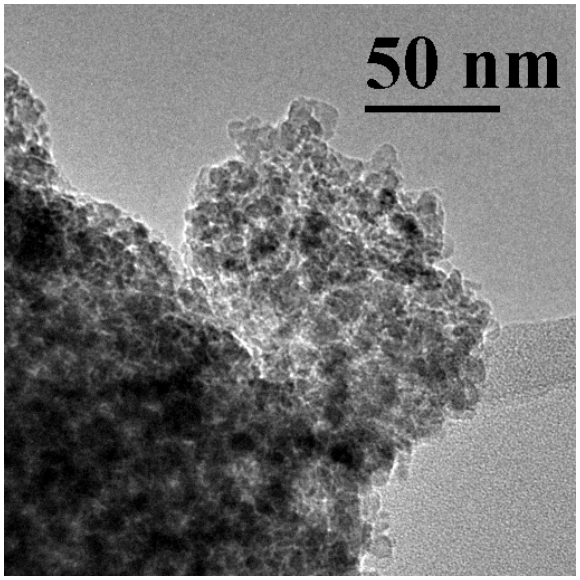

Figure S7. TEM image of 10%Ni/MgAlO$_x$ sample (Mg:Al = 3, calcination temperature of 600 °C, reduction temperature of 600 °C).

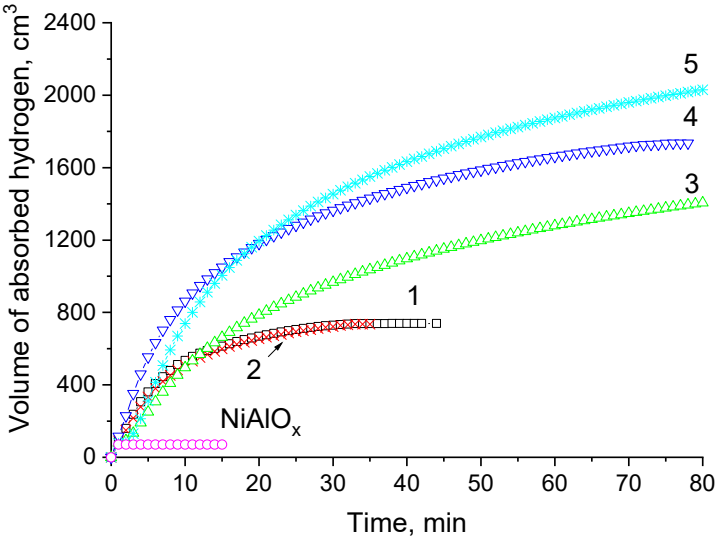

Figure S8. The volume of consumed hydrogen *vs.* the time in hydrogenation of FAL for the samples: 1 – Ni@NiAlO$_x$-2-500, 2 – Ni@NiAlO$_x$-3-500, 3 – Ni@NiAlO$_x$-3-600, 4 – Ni@NiAlO$_x$-4-500, 5 – Ni@NiAlO$_x$-4-600

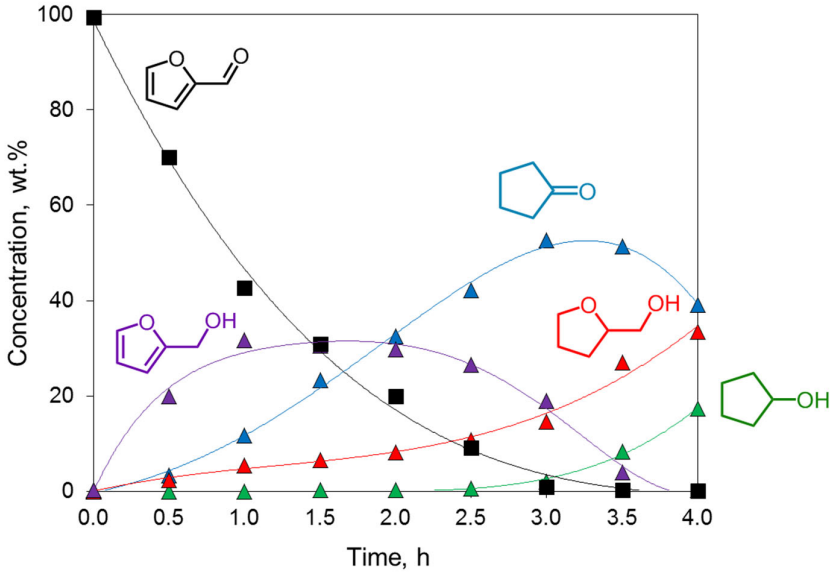

Fig. S9. Reaction composition-time profile of FAL hydrogenation over the Ni@NiAlO$_x$-4-500 catalyst at a temperature of 150 °C and pressure of 3.0 MPa. The concentration of components in the reaction solutions was found by GC.

Table S1. Main textural characteristics of samples differing in the Ni:Al atomic ratio and thermal treatment conditions. According to nitrogen adsorption-desorption at -196 °C.

Sample	Calcination temperature, °C	Reduction temperature, °C	S_{BET}, $m^2 g^{-1}$	V_{ads}, $cm^3 g^{-1}$	D_{av}, nm
NiAlO$_x$-2	600	-	179	0.37	8.3
NiAlO$_x$-3	600	-	178	0.68	15.3
NiAlO$_x$-4	600	-	122	0.28	9.1
Ni@NiAlO$_x$-2-500	600	500	171	0.37	8.9
Ni@NiAlO$_x$-2-600	600	600	125	0.38	12.5
Ni@NiAlO$_x$-4-	600	500	119	0.31	10.5

500					
Ni@NiAlO$_x$-4-600	600	600	94	0.31	13.1

Table S2. TPR data for NiAlO$_x$ samples (pre-calcination temperature 550 °C).

Sample	T_{max} of TPR, °C	Total amount of consumed H_2, mmol·g^{-1}*	Reduction degree, %**
NiAlO$_x$-2	500	4.9	55
NiAlO$_x$-2	650	9.6	105
NiAlO$_x$-2	900	10.9	120
NiAlO$_x$-3	650	9.8	93
NiAlO$_x$-3	900	11.5	108
NiAlO$_x$-4	650	11.5	105
NiAlO$_x$-4	900	11.9	108

* The observed some excess amount of consumed hydrogen is probably due to the solubility of hydrogen in metallic nickel (R.B. McLellan, P.L. Sutter, Thermodynamics of the hydrogen-nickel system, Acta Metall. 32 (1984) 2233e2239).

** evaluated from reaction: $NiO+H_2 \rightarrow Ni+H_2O$

Table S3. Results of EDX analysis of various regions of the Ni@NiAlO$_x$-4-600 sample on TEM images with the calculation of the atomic ratio of elements.

Area no.	Content, wt.%			Ni:Al	Ni:O
	O	Al	Ni		
1 [a]	20.6	8.9	70.5	4.0	0.9
2 [a]	37.8	8.7	53.6	3.0	0.4
3 [a]	15.3	8.4	76.4	4.3	1.3
4	22.9	7.7	69.4	4.0	0.9
5	19.0	6.8	74.2	4.3	1.1

6	21.8	8.7	69.5	4.0	0.9
7	19.1	8.2	72.8	4.0	1.0
8	21.9	7.2	70.9	4.0	0.9
9	17.4	10.1	72.5	3.0	1.1

[a] These areas are shown in Figure S4.