Supporting information of

Regulation of Ni/Al_2O_3 catalysts by metal deposition procedures for selective hydrogenation of adiponitrile

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Figure S1. Typical TEM image (a) and HAADF-STEM elemental line scan (b) of Ni/Al_2O_3-NH.

Figure S2. TEM image (a) and HAADF-STEM elemental mappings (b) of Ni/Al_2O_3-U.

Figure S3. Typical TEM and HR-TEM images of Ni/Al_2O_3-U sample.

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Figure S7. Influences of catalyst amount (a) and ADN/Ni molar ratio (b) on the catalytic performances by Ni/Al_2O_3-OH catalyst. Reaction conditions: 7.0 MPa H_2, 90 ^oC for 3 h in 25 mL ethanol, 2.5 g ADN for (a) and 500 mg catalyst used for (b).

Figure S8. Circular test of the Ni/Al_2O_3 sample. Reaction conditions: 7.0 MPa H_2, 80 ^oC for 3 h in 25 mL ethanol, molar ratio of ADN/Ni=13.6.

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Figure S11. Linear relationship between (a) c_{ADN} and reaction time according to zero-order reaction kinetics, and (b) lnc_{ADN} and reaction time according to first-order

reaction kinetics by Ni/Al_2O_3-OH over a temperature range of 80-120 ^oC, 7.0 MPa H_2, 800 rpm for 1.5 h, molar ratio of ADN/Ni=200.

Figure S12. Linear relationship between lnr_A and lnP_{H2} at 90 ^oC of the ADN hydrogenation by Ni/Al_2O_3-OH

Figure S13. Catalytic performance by Ni/Al_2O_3-OH and Ni/Al_2O_3-U samples. Reaction conditions: 7.0 MPa H_2, 90 ^oC for 3 h in 25 mL ethanol, molar ratio of ADN/Ni=13.6.

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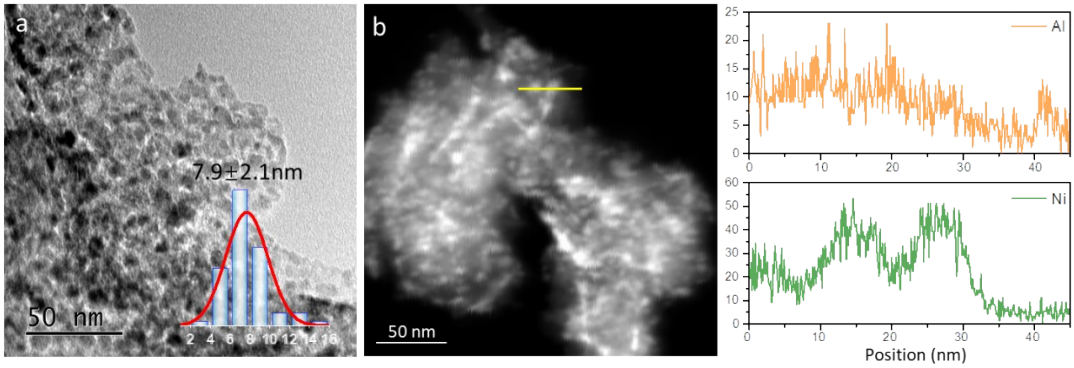
Table S2. The reaction rate (r_A) and activation energy (E_a) for the hydrogenation of ADN by different Ni/Al_2O_3 catalysts.[a]



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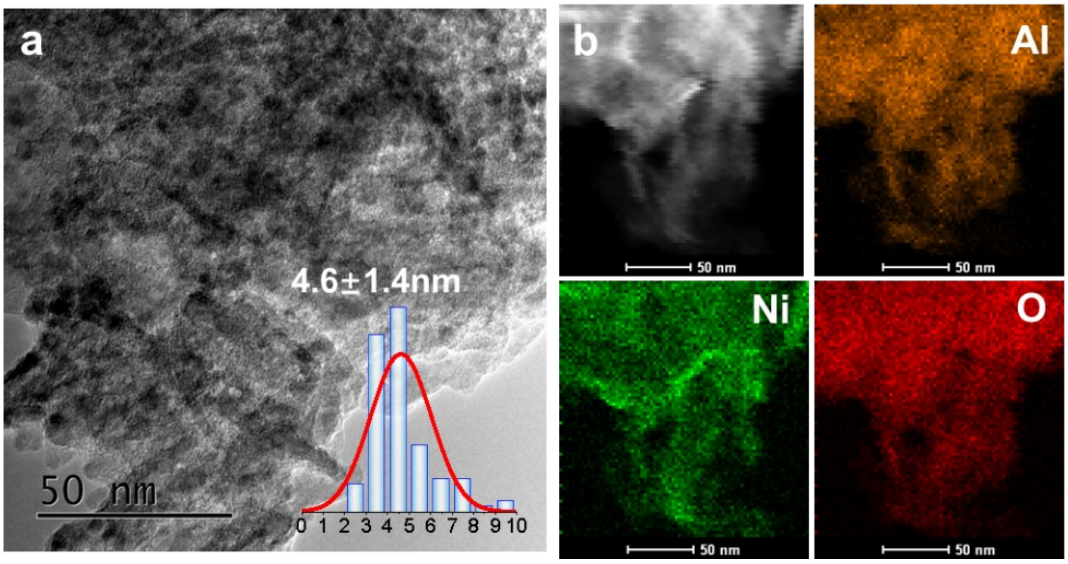

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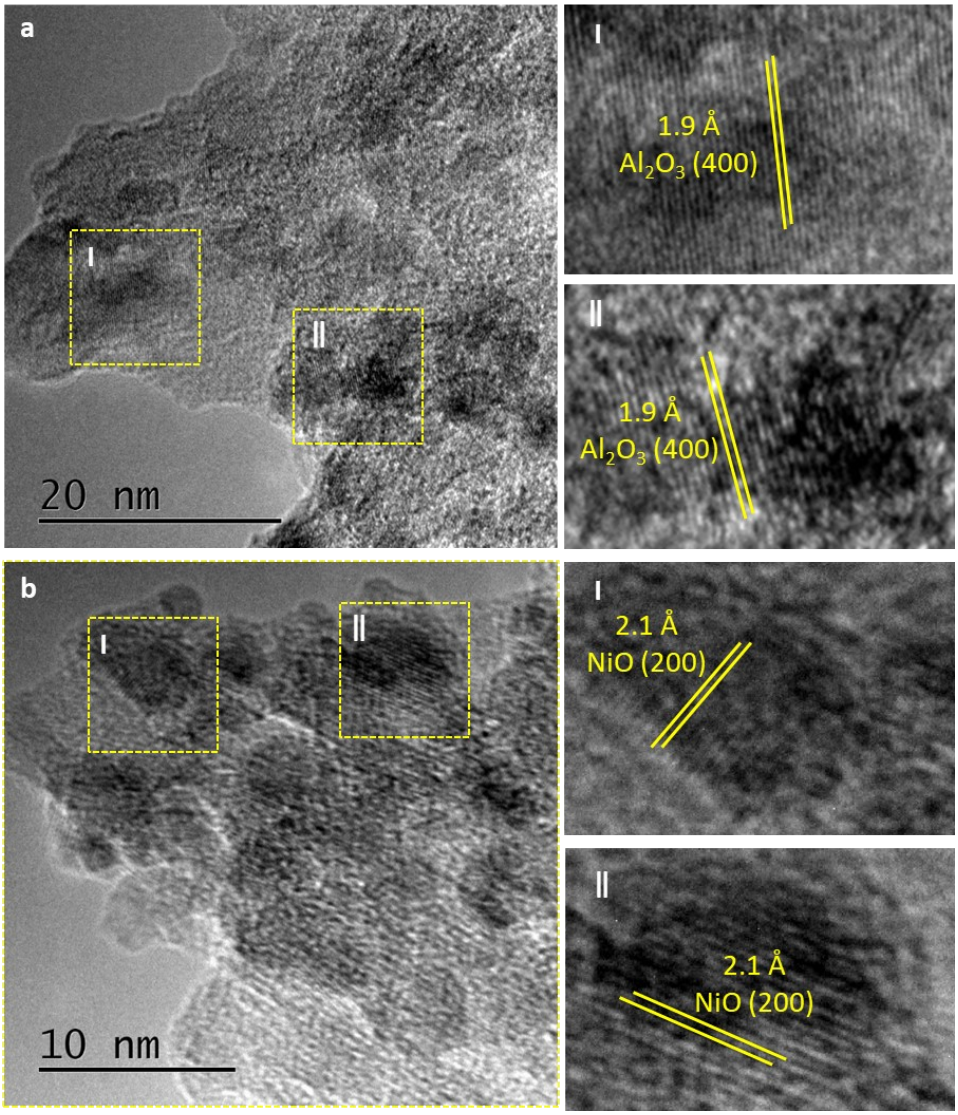

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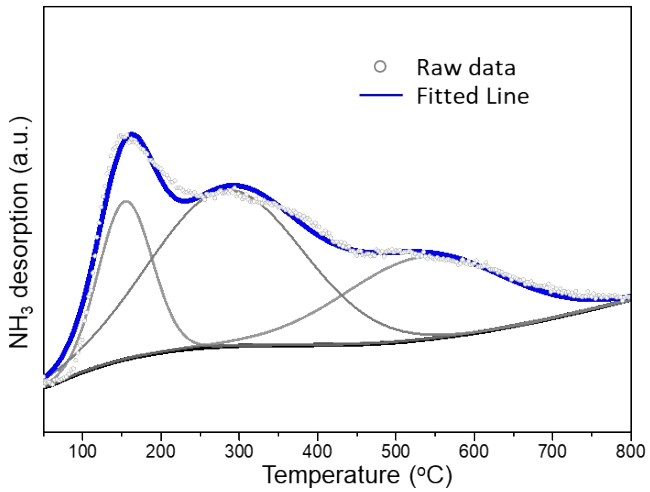

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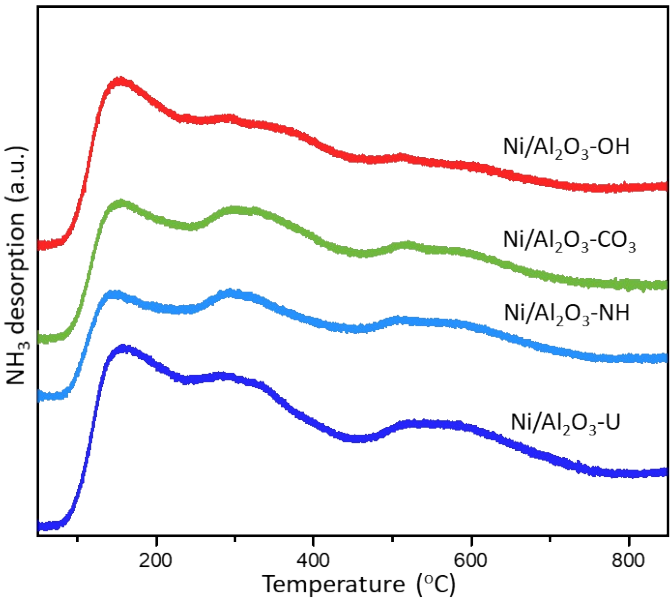

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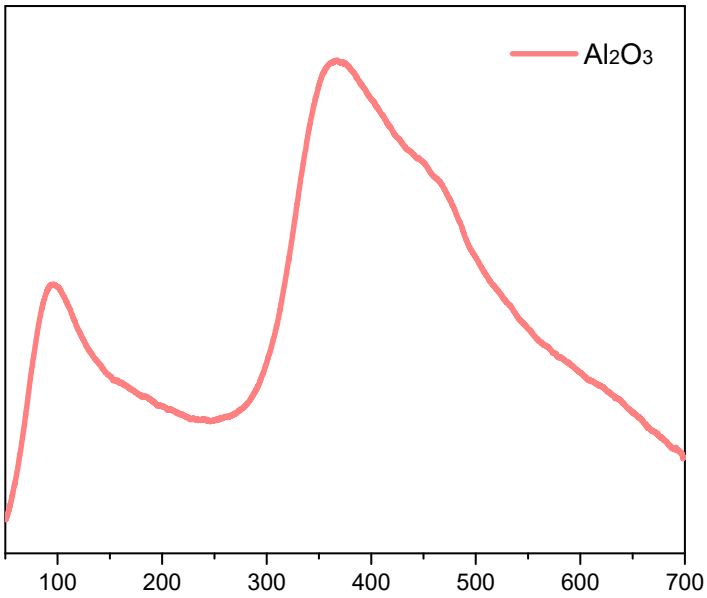
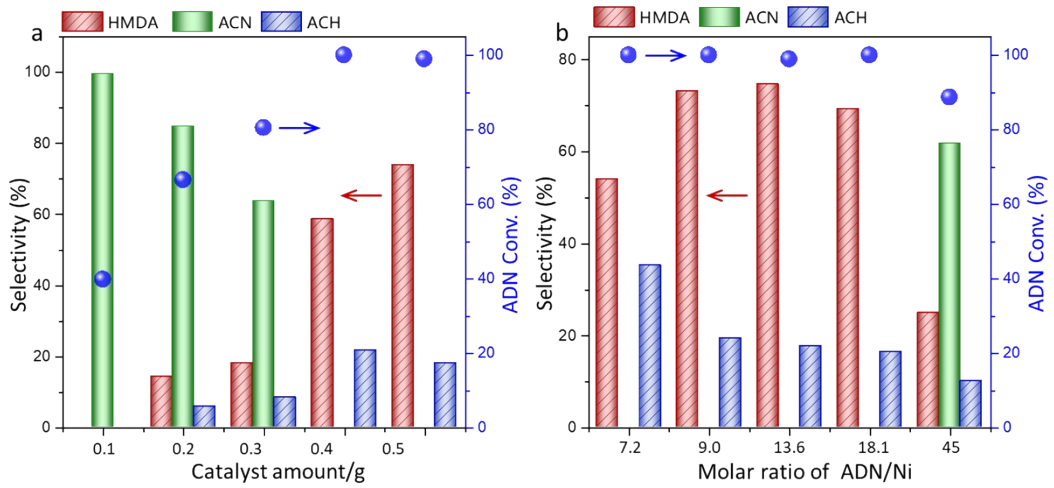


Figure S6. NH_3-TPD curve of Al_2O_3.



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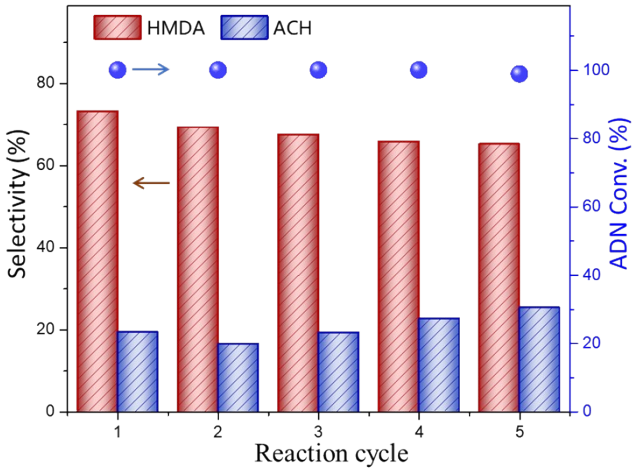

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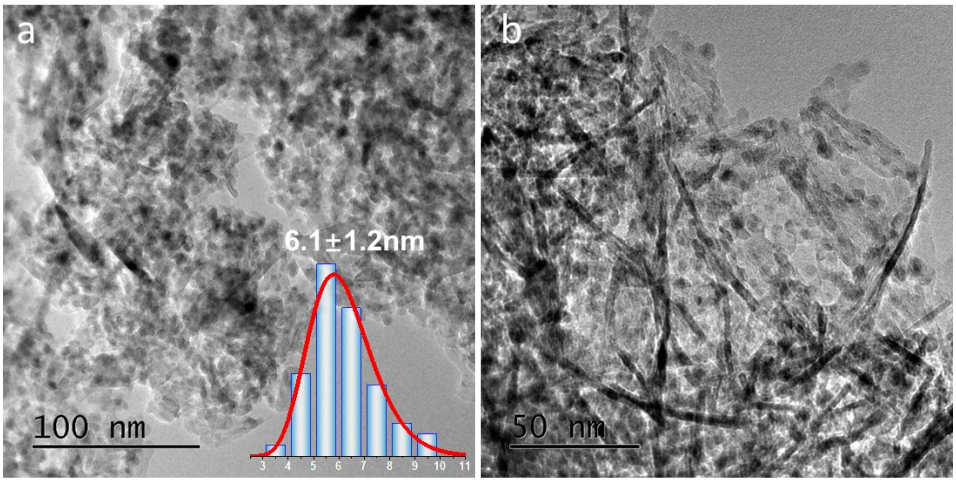

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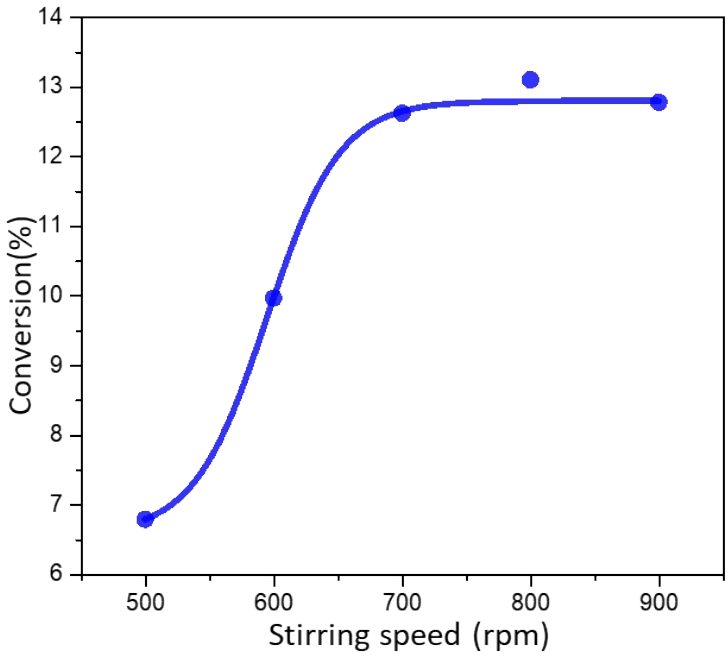

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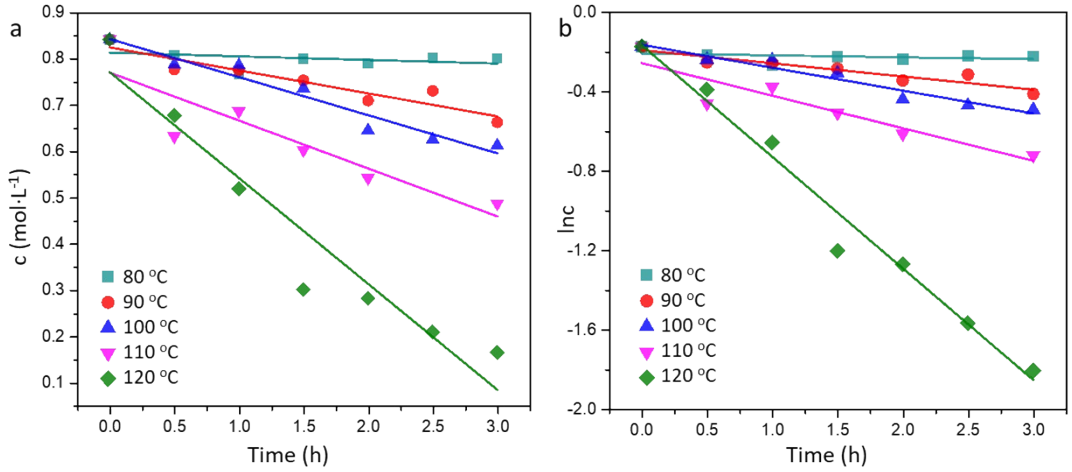

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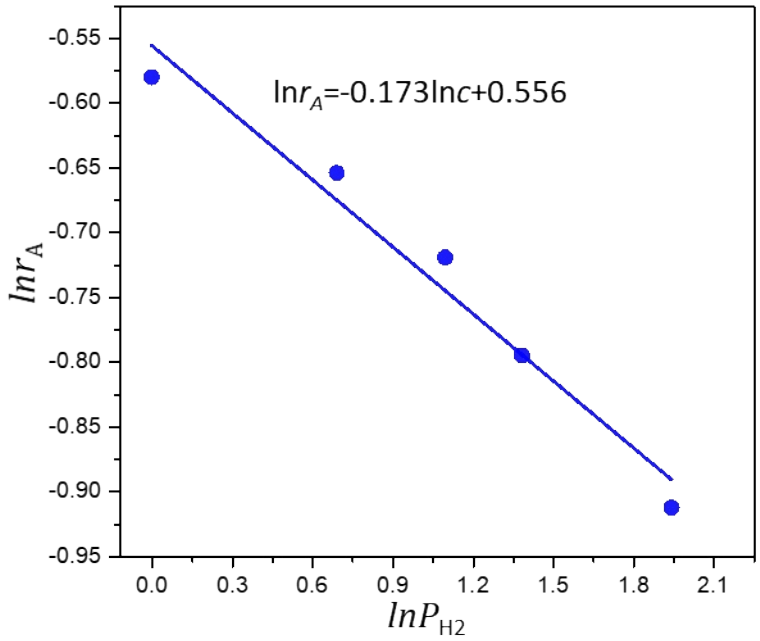

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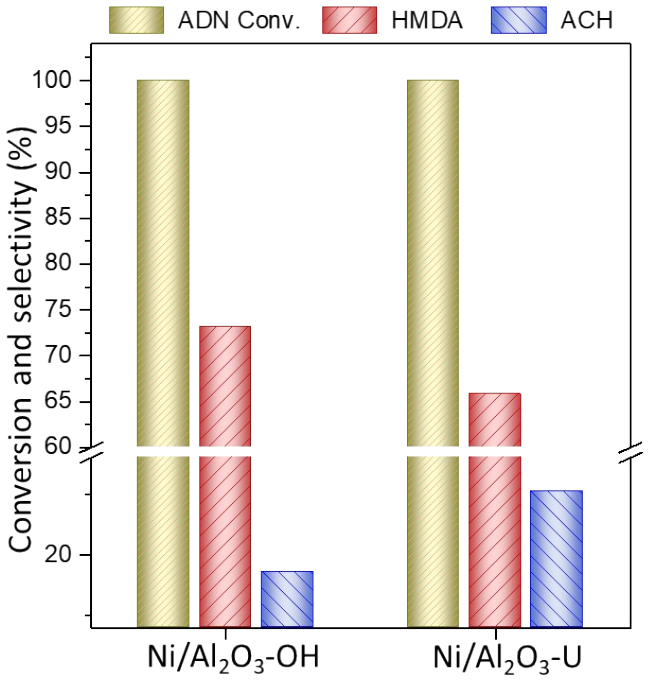

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Table S1. The R^2 for mathematics fitting of kinetic reaction models during the ADN hydrogenation by Ni/Al_2O_3-OH catalysts.[a]

Ni/Al_2O_3-OH catalyst	80 °C	90 °C	100 °C	110 °C	120 °C
Zero-order	0.38	0.94	0.97	0.90	0.96
First-order	0.37	0.94	0.97	0.93	0.99
Second-order	0.73	0.94	0.97	0.95	0.98

[a] Experiments carried out over a temperature range of 80-120 °C, 7.0 MPa H_2, 800 rpm for 1.5 h, molar ratio of ADN/Ni=200.

Table S2. The reaction rate (r_A) and activation energy (E_a) for the hydrogenation of ADN by different Ni/Al_2O_3 catalysts.[a]

Catalyst	Reaction rate ($mol \cdot L^{-1} \cdot h^{-1}$)					Ea (kJ/mol)
	80 °C	90 °C	100 °C	110 °C	120 °C	
Ni/Al_2O_3-OH	0.047	0.059	0.113	0.160	0.243	49.6
Ni/Al_2O_3-CO_3	0.021	-	0.036	0.116	0.164	62.6
Ni/Al_2O_3-NH	0.019	-	0.077	0.099	0.236	69.4
Ni/Al_2O_3-U	0.009	0.018	0.041	0.048	0.119	72.0

[a] Experiments carried out over a temperature range of 353−393 K, 7.0 MPa H_2, 800 rpm for 1.5 h, molar ratio of ADN/Ni=200.