Supporting Information

Selective Hydrogenation of Unsaturated Carbonyls by Ni-Fe based Alloy Catalysts

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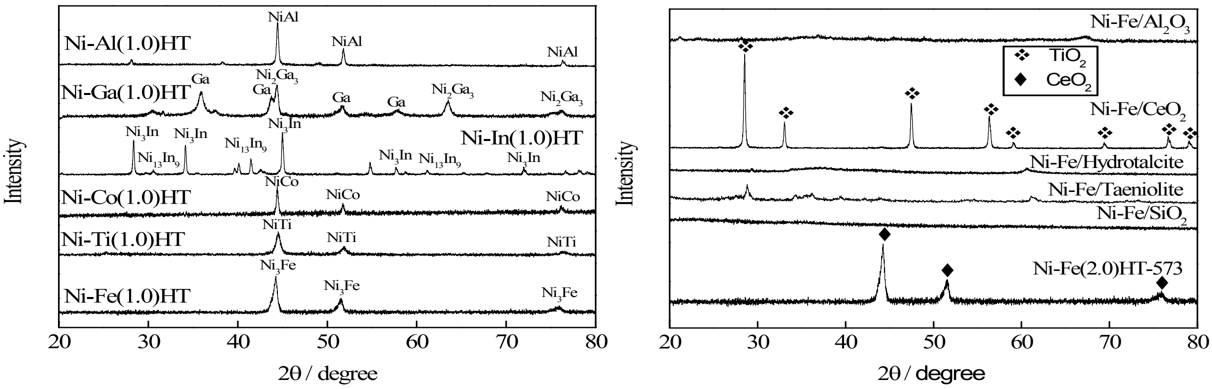


Figure S1. XRD patterns of (a) Ni-M (M = Fe, Ti, Co, In, Ga, Al) HT-673 catalysts, and (b) Ni-Fe(2)(wt. 25%) supported on M_xO_y (M_xO_y = SiO_2, Taeniolite, Hydrotalcite, CeO_2, and Al_2O_3) catalysts.

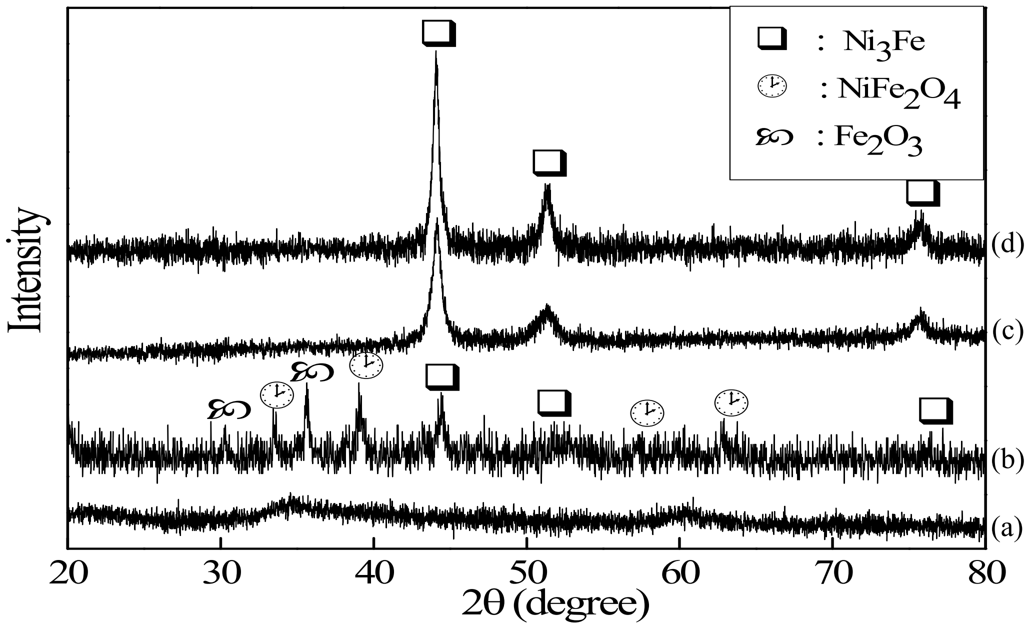


Figure S2. XRD patterns of (a) Ni-Fe(2) without hydrothermal and H_2 treatment, (b) Ni-Fe(2) hydrothermal at 423 K, without H_2 treatment, (c) Ni-Fe(2) without hydrothermal, H_2 treatment at 573 K, (d) Ni-Fe(2) hydrothermal at 423 K and H_2 treatment at 573 K.

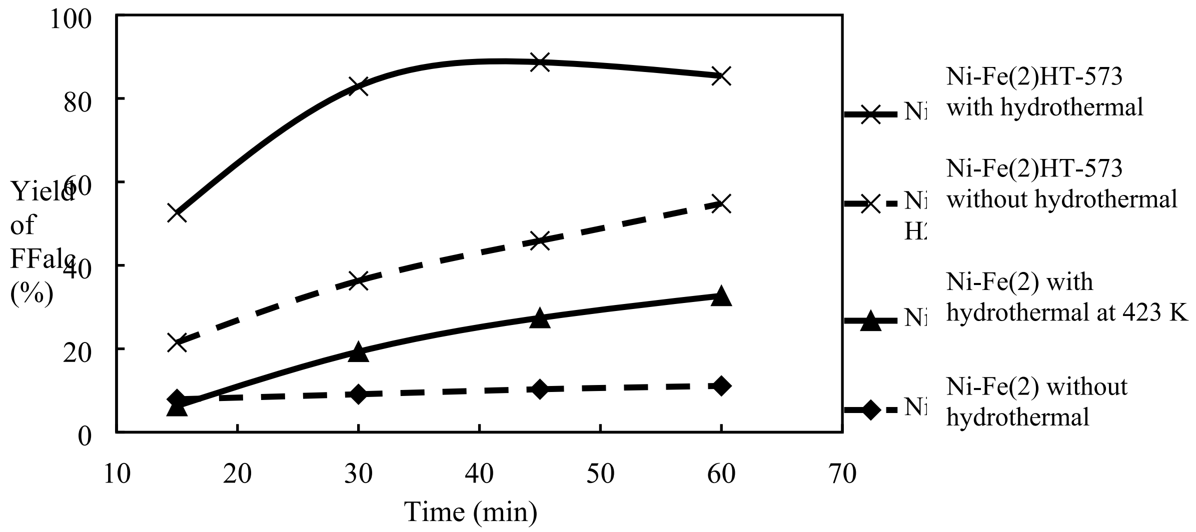


Figure S3. Effect of hydrothermal for catalytic performance of Ni-Fe alloy catalysts. *Reaction conditions*: $C°_{SUBS}$= 0.367 M; W_{CAT}= 50 mg (substrate/Ni= 2); $V_{iso\text{-}PrOH}$= 3 mL; $P°_{H2}$= 10 bar; and T= 423 K. Yield determined by GC using an internal standard technique.

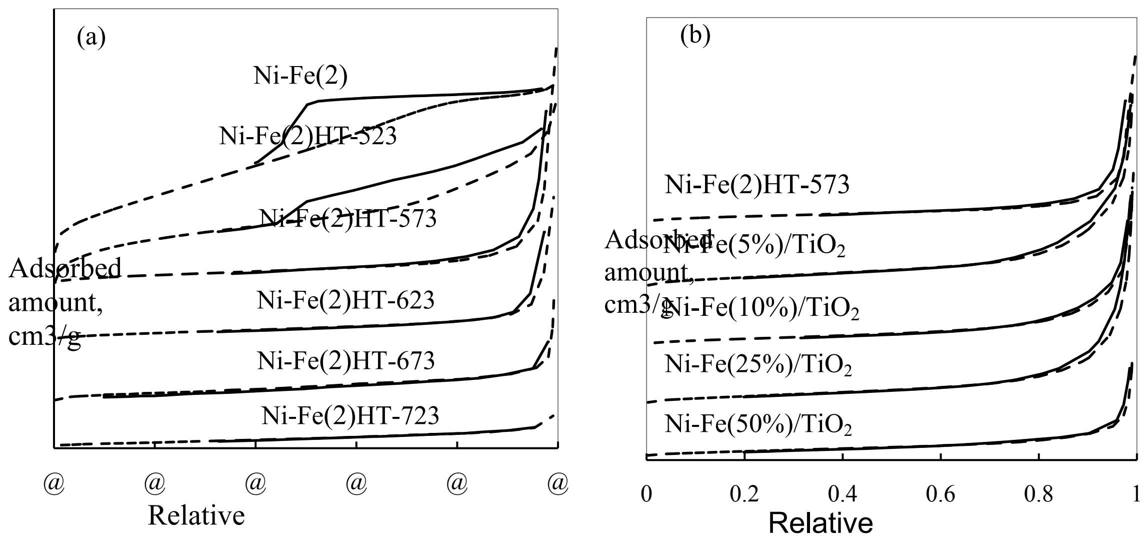


Figure S4. Typical N_2 adsorption-desorption isotherm for Ni-Fe(2); (a) with various temperatures of H_2 treatment, (b) loaded on TiO_2 with various loading amounts of Ni-Fe alloy.

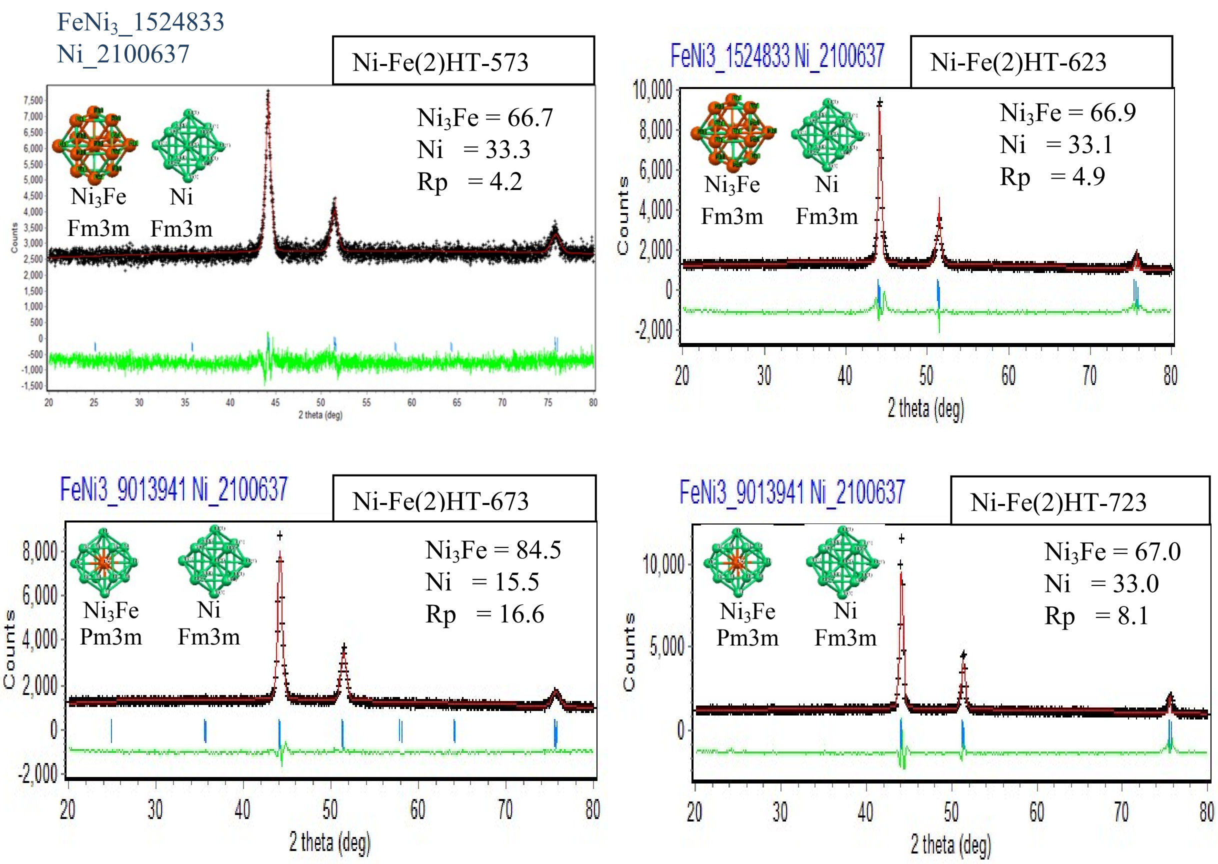


Figure S5. Multi-Rietveld analysis program LH-Riet profiles of powder XRD data of Ni-Fe(2) alloy catalysts with various temperatures of H_2 treatment. Data points (black line); calculated line, (red line); difference line, (green line); marker points (blue vertical line).

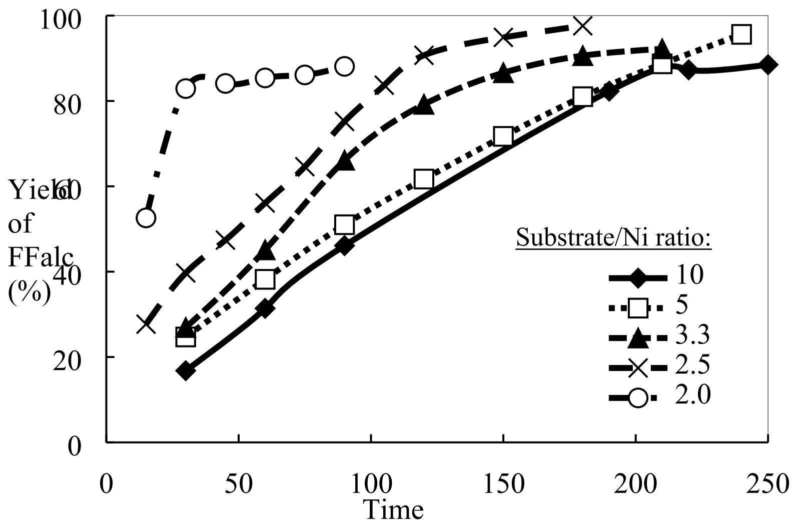


Figure S6. Effect of Substrate/Ni ratios on the yield of furfuryl alcohol (FFalc) by using Ni-Fe(2)HT-573 catalysts. *Reaction conditions*: $C°_{SUBS}$= 0.367 M; $V_{iso\text{-}PrOH}$= 3 mL; $P°_{H2}$= 10 bar; and T= 423 K. Yield determined by GC using an internal standard technique.

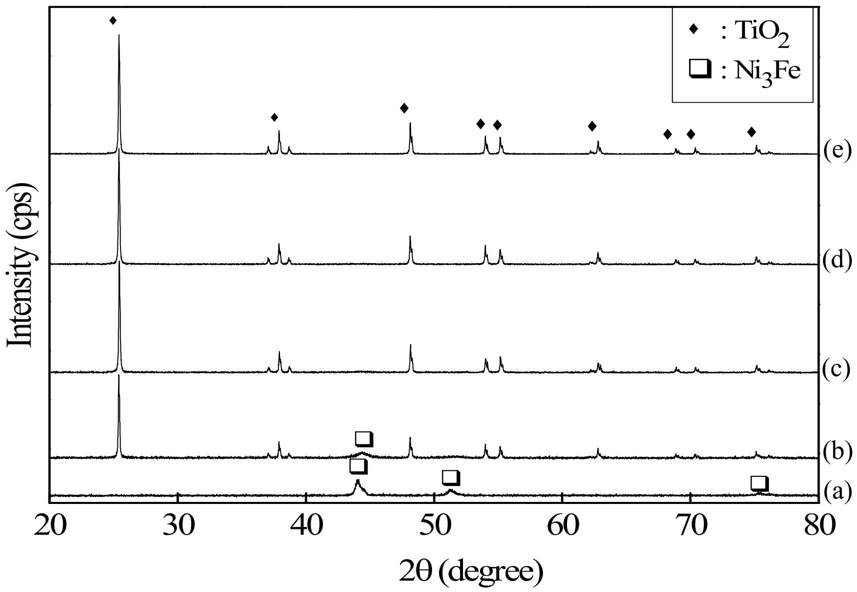


Figure S7. XRD patterns of bulk and TiO_2 supported Ni-Fe alloy with various loading amounts of Ni-Fe. (a) bulk Ni-Fe(2)HT-673, (b) Ni-Fe(wt. 50%)/TiO_2, (c) Ni-Fe(wt. 25%)/TiO_2, (d) Ni-Fe(wt. 10%)/TiO_2, (e) Ni-Fe(wt. 5%)/TiO_2.

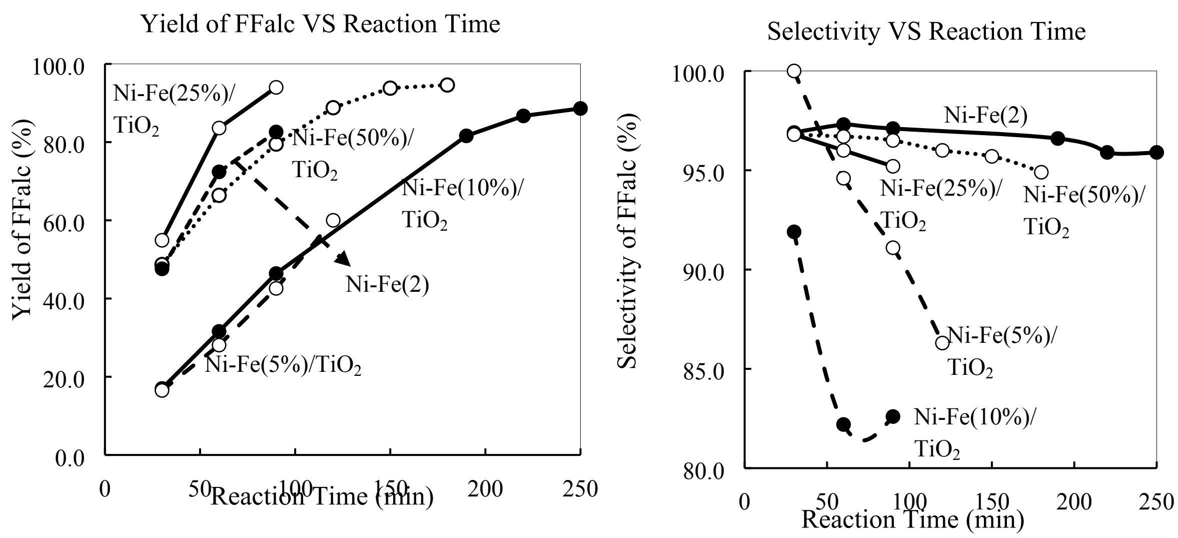


Figure S8. Time profile investigation of various loading amount of Ni-Fe alloy supported on TiO_2. *Reaction conditions*: $C°_{SUBS}$= 73.4 mM; W_{CAT}= 10 mg (Substrate/Ni= 2); $V_{iso\text{-}PrOH}$= 3 mL; $P°_{H2}$= 10 bar; and T= 423 K.

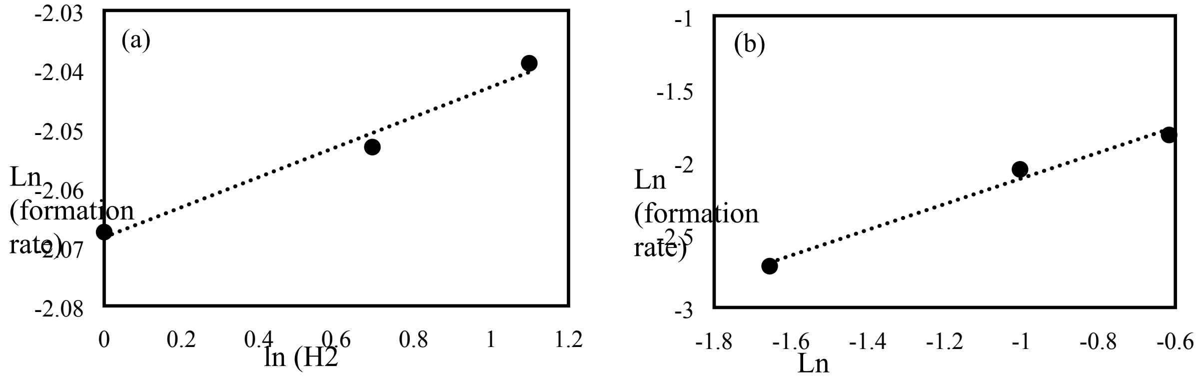
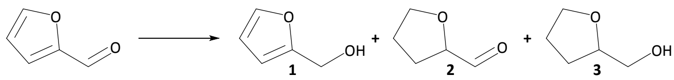


Figure S9. Effect of (a) initial H_2 pressure and (b) furfural concentration over bulk Ni-Fe(2)HT alloy catalysts.

Table S1. Comparison data for liquid-phase chemoselective hydrogenation of unsaturated carbonyls



Catalyst	P_{H2} (MPa)	T (K)	t (min)	Conv. (%)	Sel. of **1** (%)	Ref.
Pt-Cu hollow-core	2	423	720	100	100	[1]
7.5%Pt@g-C_3N_4	1	373	300	95	>99	[2]
Pd-Cu/MgO	0.6	383	30	98	98	[3]
Cu(3):Zn(2):Cr(1):Zr(4)	2	443	210	96	96	[4]
Co/SBA-15	2	423	90	91	96	[5]
Ni-Cu/Al_2O_3	5	403	100	90	100	[6]
Fe(NiFe)O_4-SiO_2	2	363	240	94	100	[7]
Ni-Sn(3-2)HT-673	3	383	75	67	100	[8]
Ni-Fe(2-1)HT-573	1	423	30	90	92	This Work

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