

Supplementary Information

Role of Acid Sites and Surface Hydroxyl Groups in Isophthalonitrile Hydrogenation Catalyzed by Supported Ni-Co Catalysts

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Table S1. Comparison of the calculation results of k_r over $x\text{Ni-}y\text{Co}/\text{Al}_2\text{O}_3$ using two models

Catalyst	Reaction results ^a	
	$k_r(10^{-2} \text{ mol}^{0.2} \text{ L}^{-0.2} \text{ min}^{-1})$	$k_r(10^{-2} \text{ min}^{-1})$
	$p=0.8^b$	$p=1^b$
2.5Ni-0.625Co/Al ₂ O ₃	0.6 (0.99)	0.9 (0.98)
5Ni-1.25Co/Al ₂ O ₃	2.1 (0.99)	3.6 (0.89)
10Ni-2.5Co/Al ₂ O ₃	2.4 (0.99)	4.2 (0.96)
20Ni-5Co/Al ₂ O ₃	2.8 (0.99)	5.9 (0.93)

^a Reaction conditions: 80 °C, 6.0 MPa, catalyst of 200~400 μm containing 0.25g Ni and 0.0625g Co, 80 mL of toluene and 20 mL of methanol as solvent, 2.9 g of IPN feed, 0.086 g of NaOH, 180 mL min⁻¹ H₂ gas flow, and stirring speed of 800 rpm.

^b The numbers in brackets are the corresponding R².

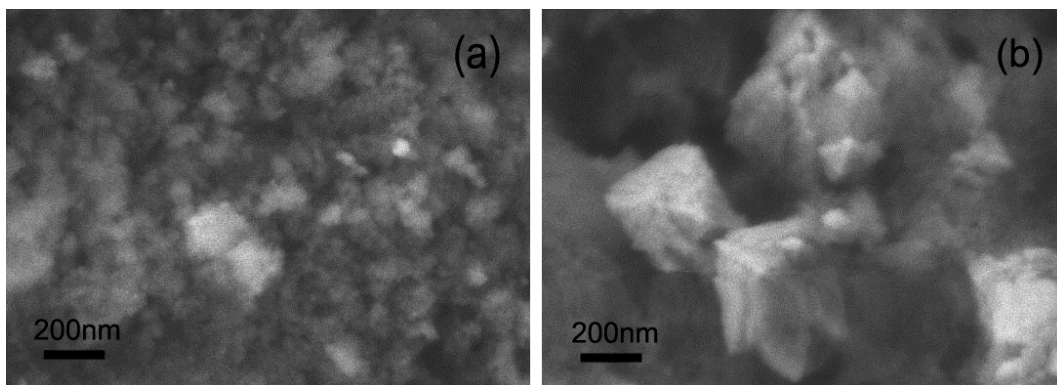


Fig. S1. SEM images of (a) 20Ni-5Co/SiO₂, (b) 20Ni-5Co/Al₂O₃(SI)

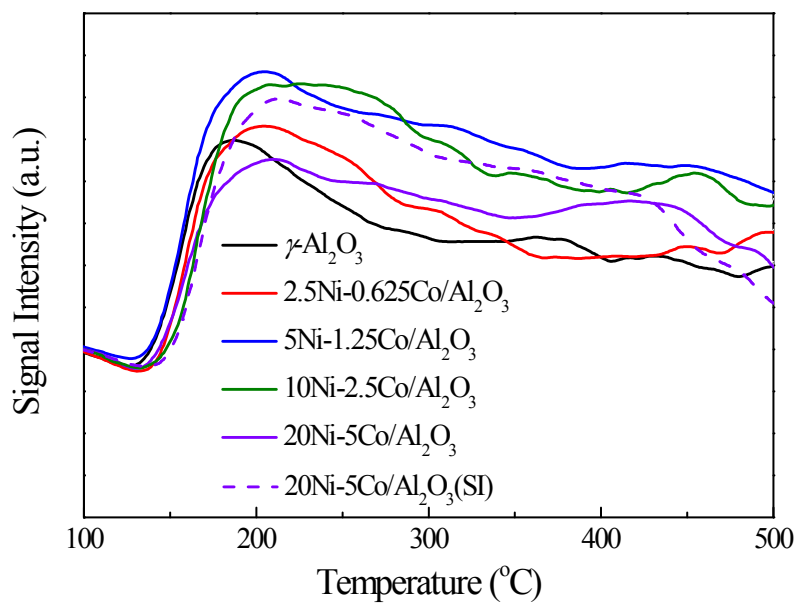


Fig. S2. NH₃-TPD profiles of γ -Al₂O₃ supported catalysts and the support

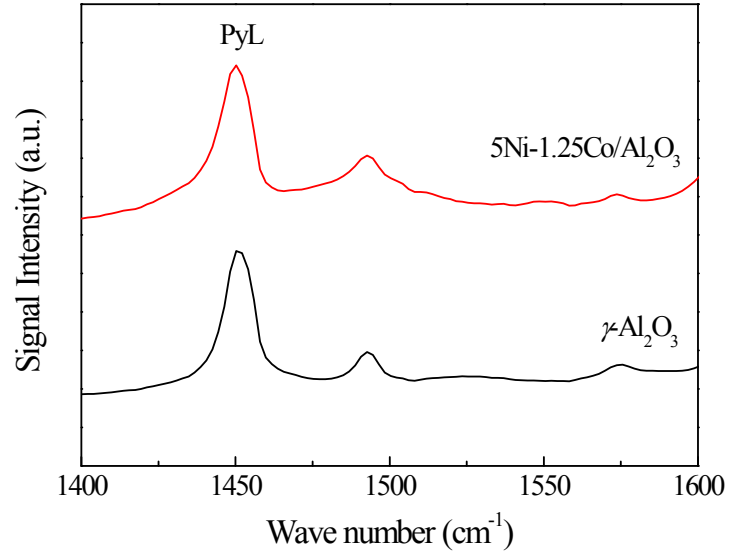


Fig. S3. FT-IR spectra of pyridine adsorbed on $\gamma\text{-Al}_2\text{O}_3$ and $5\text{Ni-1.25Co/Al}_2\text{O}_3$ at $200\text{ }^\circ\text{C}$ (after background correction). The bands at 1450 cm^{-1} are the characteristic peaks of Lewis (PyL) acid sites, and those at 1490 cm^{-1} were the characteristic peaks of $\gamma\text{-Al}_2\text{O}_3$.

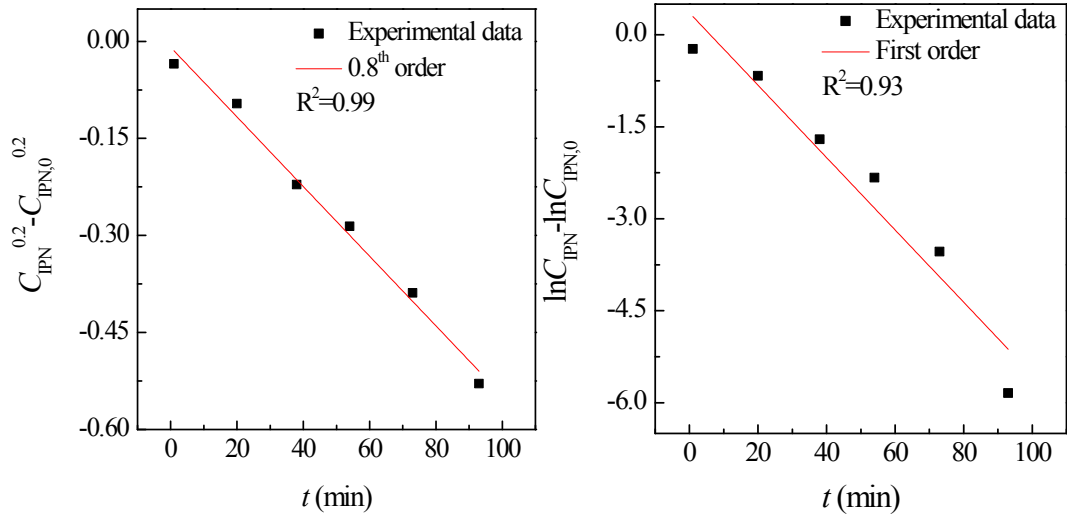


Fig. S4. Fitting results of k_t over $20\text{Ni-5Co/Al}_2\text{O}_3$ with reaction order of $p = 0.8$ and 1.0

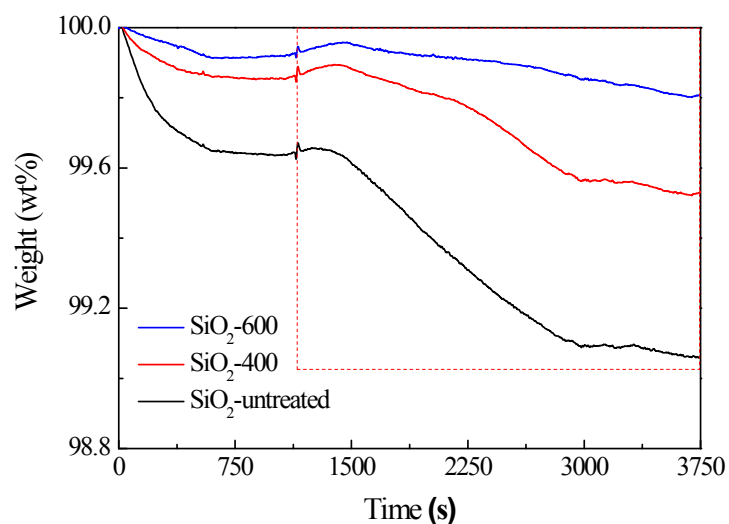


Fig. S5. TG-DTA profiles of the treated and untreated SiO₂

SiO₂-400 and SiO₂-600 were the SiO₂ samples calcined at 400 °C and 600 °C for 4 h, respectively.

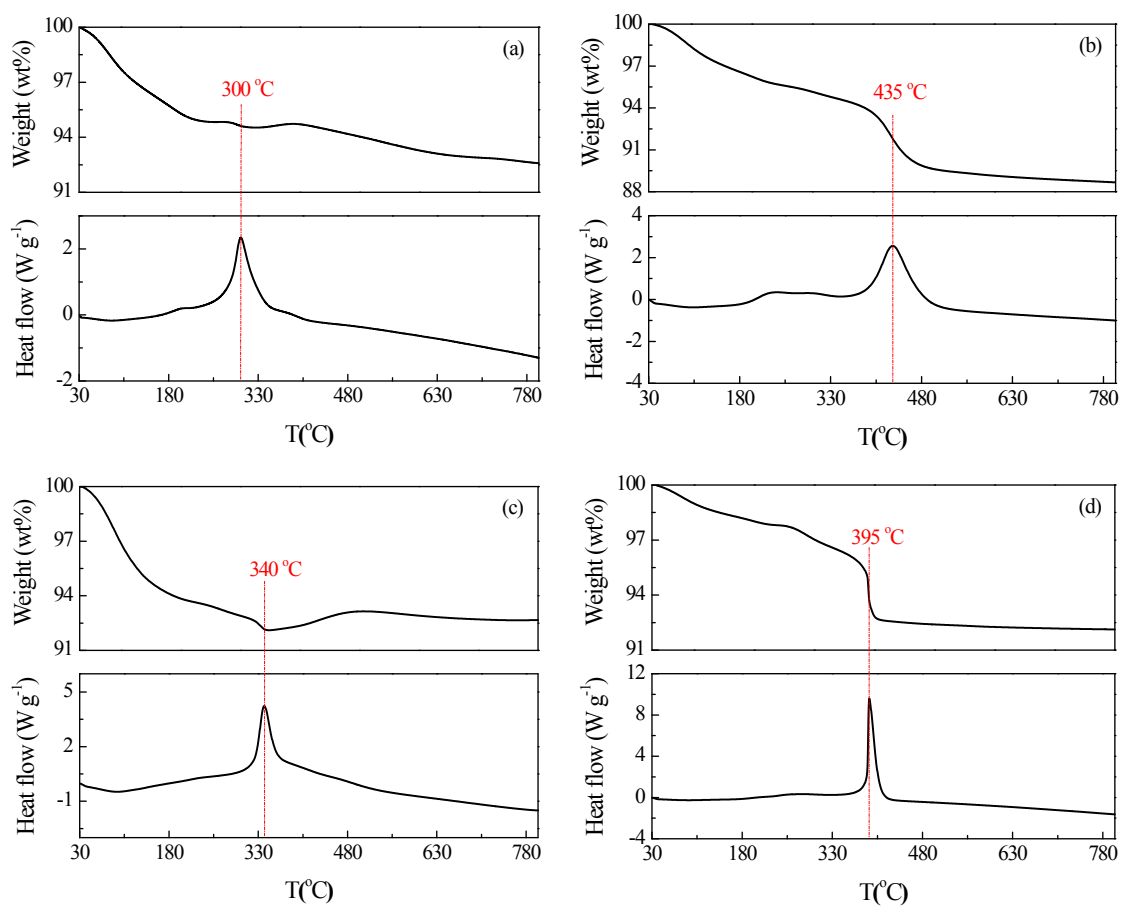


Fig. S6. TG-DTA results of the spent catalysts: (a) 20Ni-5Co/Al₂O₃(SI), (b) 2.5Ni-0.625Co/Al₂O₃, (c) 20Ni-5Co/SiO₂(SI), (d) 2.5Ni-0.625Co/SiO₂