Electronic Supplementary Material (ESI) for RSC Advances.

Supporting information

Effects of calcination and reduction temperature on the property of Ni-P/SiO2, Ni-P/Al2O3 and its hydrodenitrogenation performance

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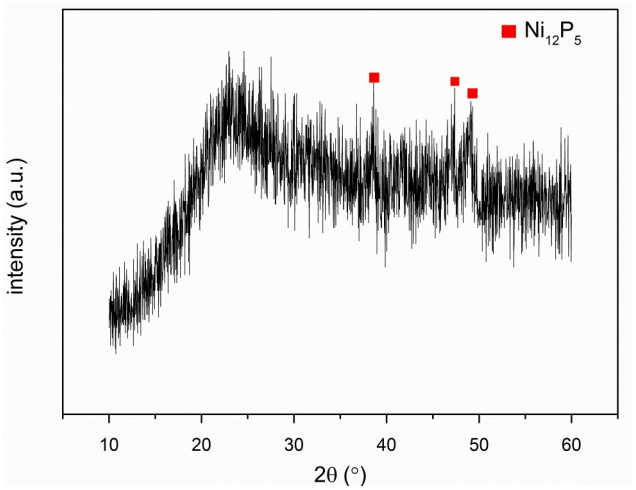
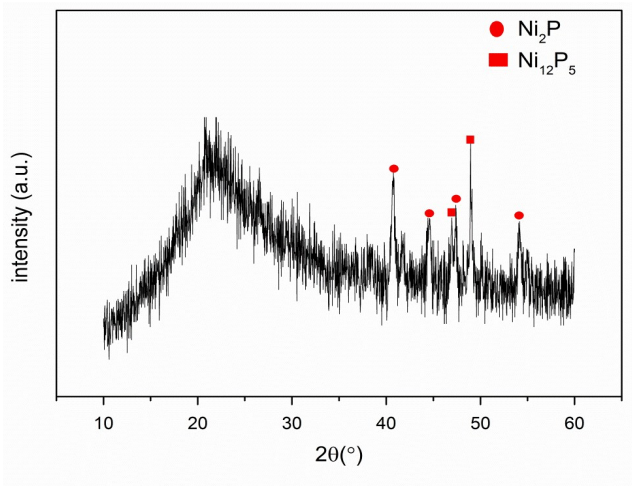


a



b

Figure S1. XRD patterns of Ni-P_{440}/SiO_2 reduced at (a) 460 ℃, (b) 520 ℃.

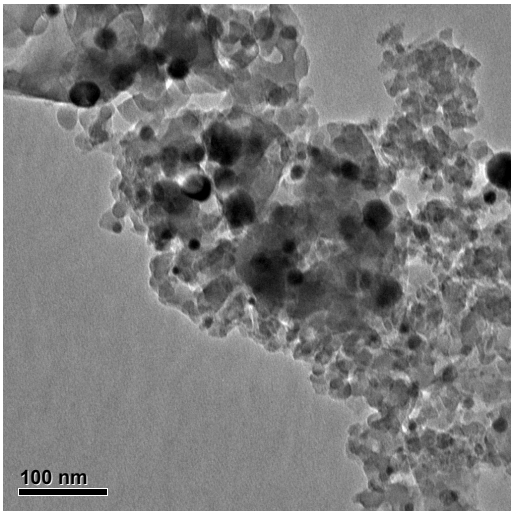


Figure S2. HRTEM image of Ni-P/$^{750}_{620}SiO_2$.

Table S1. Thetrue and theoretical consumption of H_2 and the molar ratio of true consumption of H_2 to theoretical consumption of H_2 for Ni-P_x/SiO_2 (x= 440, 500, 560, 620) at a heating rate of 10 ℃/min.

Samples	True consumption of H_2 (moL)	Theoretical consumption of H_2 (moL)	The molar ratio of true consumption of H_2 to theoretical consumption of H_2
Ni-P_{440}/SiO_2	$1.703*10^{-4}$	$1.809*10^{-4}$	94.14 %
Ni-P_{500}/SiO_2	$1.684*10^{-4}$	$1.809*10^{-4}$	93.09 %
Ni-P_{560}/SiO_2	$1.691*10^{-4}$	$1.802*10^{-4}$	93.84 %
Ni-P_{620}/SiO_2	$1.619*10^{-4}$	$1.745*10^{-4}$	92.81 %

Table S2. The true and theoretical consumption of H_2 and the molar ratio of true consumption of H_2 to theoretical consumption of H_2 for Ni-P_x/Al_2O_3 (x= 440, 500, 560, 620) at a heating rate of 10 ℃/min.

Samples	True consumption of H_2 (moL)	Theoretical consumption of H_2 (moL)	The molar ratio of true consumption of H_2 to theoretical consumption of H_2
Ni-P_{440}/Al_2O_3	$0.957*10^{-4}$	$1.053*10^{-4}$	90.9 %
Ni-P_{500}/Al_2O_3	$0.941*10^{-4}$	$1.053*10^{-4}$	89.4 %
Ni-P_{560}/Al_2O_3	$0.895*10^{-4}$	$1.007*10^{-4}$	88.9 %
Ni-P_{620}/Al_2O_3	$0.807*10^{-4}$	$0.96*10^{-4}$	84.1 %

Table S3. Py-IR spectra for Ni-P^{560}_{440}/SiO_2, Ni-P^{560}_{500}/SiO_2, Ni-P^{560}_{560}/SiO_2, Ni-P^{560}_{620}/SiO_2, Ni-P^{750}_{440}/Al_2O_3, Ni-P^{750}_{500}/Al_2O_3, Ni-P^{750}_{560}/Al_2O_3 and Ni-P^{750}_{620}/Al_2O_3.

Samples	Brønsted acidity (μmol/g)		Lewis acidity (μmol/g)	
	100℃	200℃	100℃	200℃
Ni-P^{560}_{440}/SiO_2	31	19	58	32
Ni-P^{560}_{500}/SiO_2	27	19	61	29
Ni-P^{560}_{560}/SiO_2	28	17	57	29
Ni-P^{560}_{620}/SiO_2	23	15	57	28
Ni-P^{750}_{440}/Al_2O_3	37	23	173	129
Ni-P^{750}_{500}/Al_2O_3	37	21	174	126
Ni-P^{750}_{560}/Al_2O_3	35	22	169	127
Ni-P^{750}_{620}/Al_2O_3	33	17	172	128