

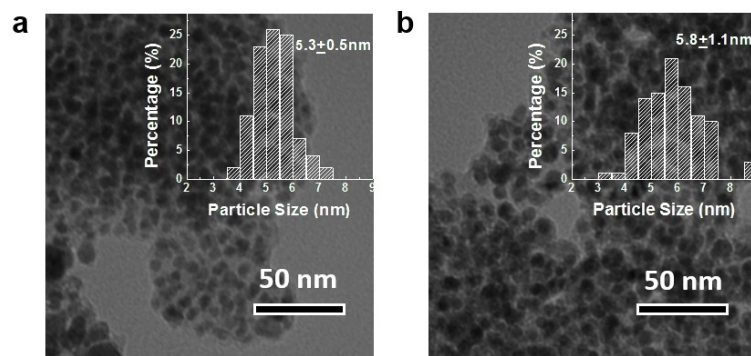
## Supporting Information for:

NiCo bimetallic nanoparticles encapsulated in graphite-like carbon layers as efficient and robust hydrogenation catalysts

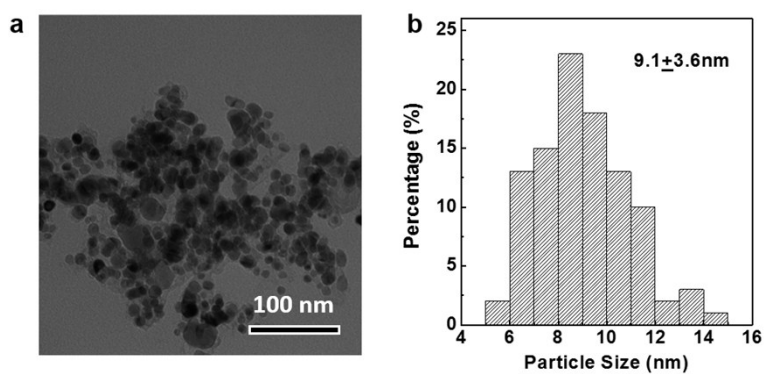
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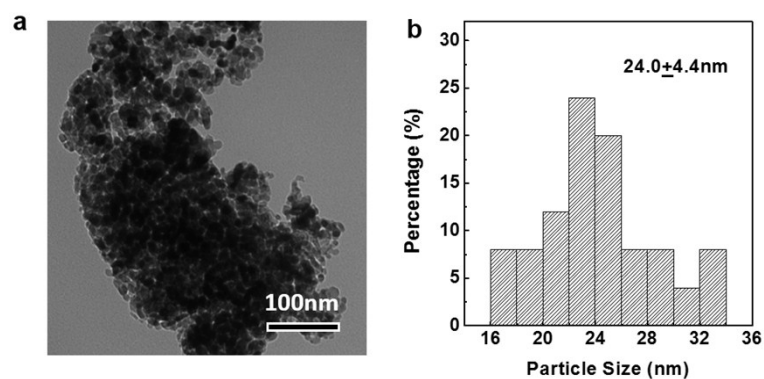
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**Figure S1.** TEM images of (a)  $\text{Ni}_{0.25}\text{Co}_{0.75}@NC$  and (b)  $\text{Ni}_{0.75}\text{Co}_{0.25}@NC$  catalysts.



**Figure S2.** (a) TEM image and (b) size distribution of the Co@NC nanoparticles.



**Figure S3.** (a) TEM image and (b) size distribution of the Ni@NC nanoparticles.

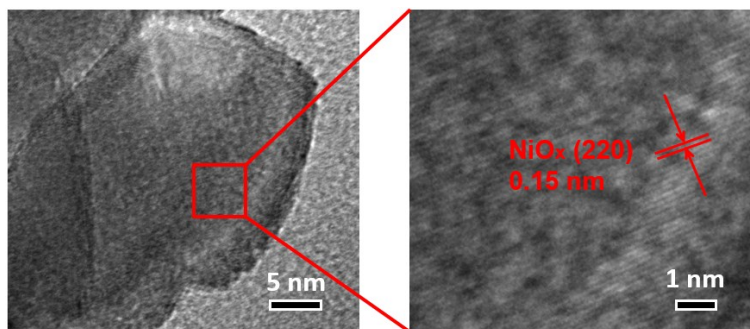


Figure S4. HRTEM images of the Ni@NC catalysts.

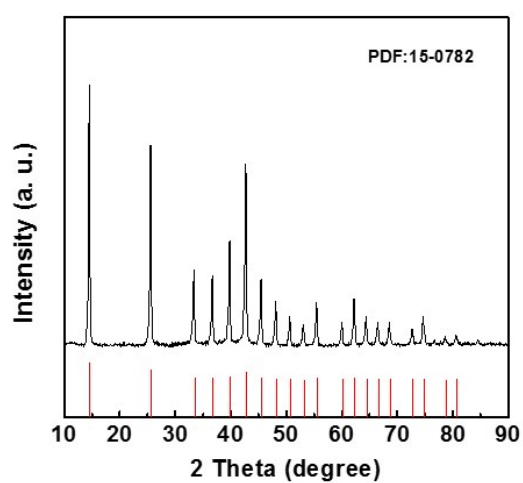


Figure S5. XRD pattern of the Ni(HCO<sub>3</sub>)<sub>2</sub> precursor.

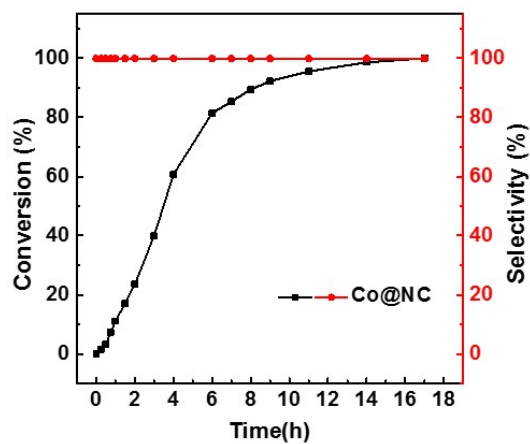
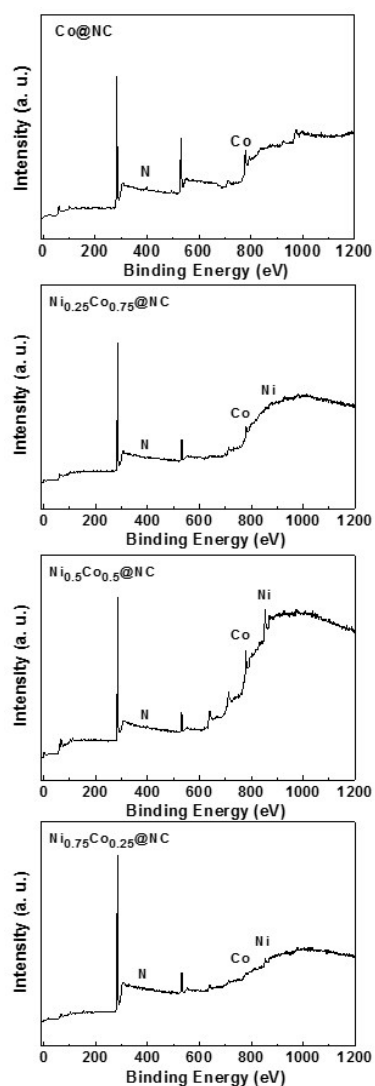
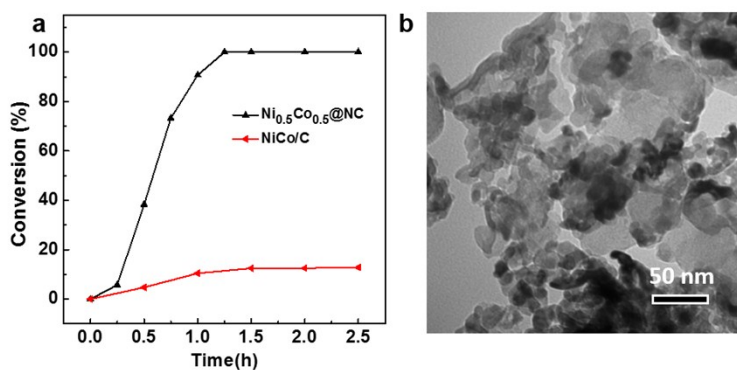


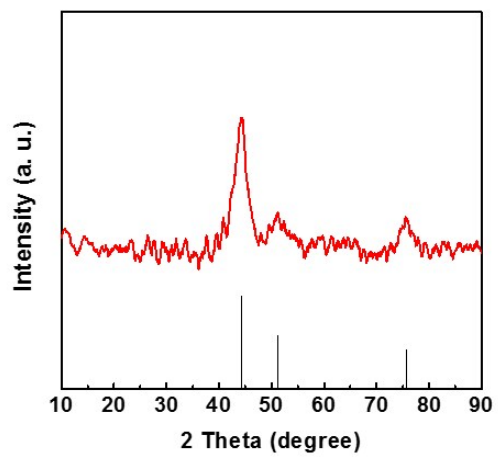
Figure S6. The time course of catalytic activity and chemoselectivity of the Co@NC catalysts for hydrogenation of 4-chlorostyrene.



**Figure S7.** XPS spectra of various  $\text{Ni}_x\text{Co}_{1-x}@NC$  ( $x=0, 0.25, 0.5, 0.75$ ) catalysts.



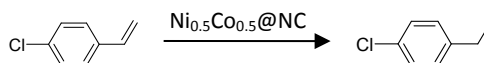
**Figure S8.** (a) The time course of catalytic activity of the  $\text{Ni}_{0.5}\text{Co}_{0.5}@NC$  and  $\text{NiCo}/C$  catalysts for hydrogenation of 4-chlorostyrene. (b) TEM image of the  $\text{NiCo}/C$  nanoparticles.



**Figure S9.** XRD pattern of the used  $\text{Ni}_{0.5}\text{Co}_{0.5}\text{@NC}$  catalysts after 8 cycles of hydrogenation reactions.

**Table S1.** Chemical compositions of the Ni<sub>x</sub>Co<sub>1-x</sub>@NC catalysts by ICP measurements.

Sample	Ni content (wt%)	Co content (wt%)	C content (wt%)
Ni <sub>0.25</sub> Co <sub>0.75</sub> @NC	17.04	73.64	9.32
Ni <sub>0.5</sub> Co <sub>0.5</sub> @NC	46.42	44.26	9.32
Ni <sub>0.75</sub> Co <sub>0.25</sub> @NC	68.68	22.83	8.49
Co@NC	0	90.86	9.14

**Table S2.** The optimization of reaction conditions for hydrogenation of 4-chlorostyrene\*

Entry	Temperature (°C)	Pressure (MPa)	Time (h)	Conv. (%)	Sel. (%)
1	40	2	1	15.9	99.9
2	60	2	1	90.7	99.9
3	80	2	1	100	99.9
4	60	1	3	66.4	99.9
5	60	1.5	3	87.5	99.9
6	60	2	3	100	99.9

\*4-chlorostyrene (1 mmol), isopropanol (1 mL), Ni<sub>0.5</sub>Co<sub>0.5</sub>@NC catalyst (10 mg). The conversion and selectivity were determined by GC-MS and GC with m-xylene as internal standard.