

## **Supporting Information:** Experimental details.

All chemicals were analytical grade and used as received without further purification.

**Synthesis of LNHS–Sal precursor.** The LNHS–Sal precursor was prepared by a simple coprecipitation method. In a typical procedure, an aqueous solution (100 ml) of was added to an aqueous solution (150 ml) of with continuous stirring. The  $\text{Ni}(\text{NO}_3)_2 \cdot 6\text{H}_2\text{O}$  (0.02 mol), NaHsal (0.04 mol) and urea (0.06 mol) were placed in a 250 mL deionized water in an autoclave at 140 °C for 24 h. The resulting product was separated by centrifugation, washed repeatedly with distilled water, and dried at 40° C in air.

**Synthesis of Ni@C nanocomposites.** A sample of the LNHS–Sal precursor was placed in a ceramic boat which was placed in a furnace and purged with  $\text{N}_2$  gas for 2 min. Under continuous flow (60 mL/min) of  $\text{N}_2$  gas, the furnace temperature was raised at a ramping rate of 5 °C/min and then kept at 500 °C for 2 h.

## **Characterization**

Powder X-ray diffraction (XRD) patterns were recorded on a Shimadzu XRD-6000 diffractometer operated at 40 kV and 30 mA at the wavelength of Cu  $\text{K}\alpha$  radiation ( $\lambda = 0.15406$  nm); Scanning electron microscopy (SEM) images were obtained using a Hitachi S-4700 field emission SEM at 20 kV, with the surface of the samples coated with a thin platinum layer to avoid a charging; Fourier transform infrared (FT-IR) spectra were recorded in the range 4000 to 400  $\text{cm}^{-1}$  with 2  $\text{cm}^{-1}$  resolution on a Bruker Vector-22 Fourier transform spectrometer using the KBr pellet technique (1 mg of sample in 100 mg of KBr); Thermogravimetry (TG–DTA, Perkin–Elmer Diamond TG apparatus); X-ray photoelectron spectra (XPS) were recorded on a

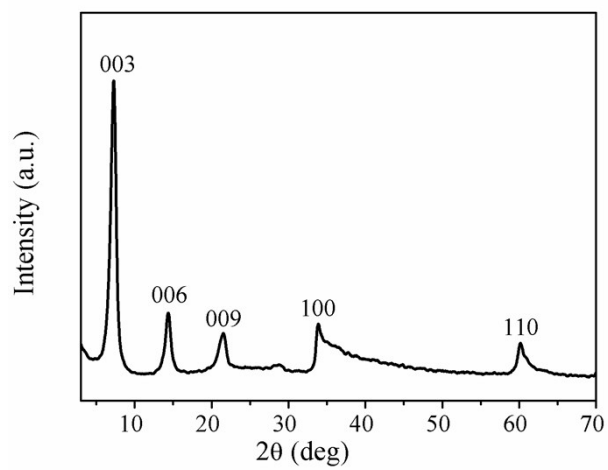
Thermo VG ESCALAB 250 X-ray photoelectron spectrometer at a pressure of about  $2 \times 10^{-9}$  Pa using Al K $\alpha$  X-rays as the excitation source; Energy dispersive X-ray spectra (EDX Energy Dispersive X-ray Detector); High resolution transmission electron microscopy (HRTEM) were carried out using a JEOL JEM-2010 electron microscope with an accelerating voltage of 200 kV ; Elemental analysis was carried out using an Elementar vario MICRO cube instrument; Raman spectroscopy was performed on a Renishaw RM2000 confocal Raman spectrometer with a 514 nm excitation laser; and the specific surface area and pore volume and size analysis were performed by the Brunauer–Emmett–Teller (BET) and Barrett–Joyner–Halenda (BJH) methods respectively using a Quantachrome Autosorb-1C-VP Analyzer.

### **Catalytic Reaction Tests**

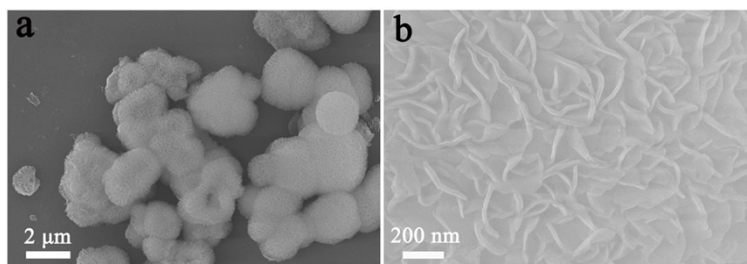
The reduction reaction of p-nitrophenol by NaBH<sub>4</sub> was used as a model system to quantitatively evaluate the catalytic activity of the as-synthesized nanocomposites. In a typical procedure, the aqueous solutions of p-nitrophenol (5 mM) and NaBH<sub>4</sub> (1.5 M) were freshly prepared. 2 mL of NaBH<sub>4</sub> solution and a certain amount of catalysts were added to 100 mL of DI water. Then, 2 mL of p-nitrophenol solution was injected into the mixture to start the reaction. During the reaction process, 2 mL of the reaction solution was withdrawn from the reaction system at a regular time followed by measuring UV-vis spectra of the solution to monitor the concentration of p-nitrophenol through its absorption peak at 400 nm.

After the completion of the fresh reaction performed with the above typical procedure, the catalyst was easily separated from the liquid reaction mixture by an external magnet and could be reused for the next run after addition of fresh reactants.

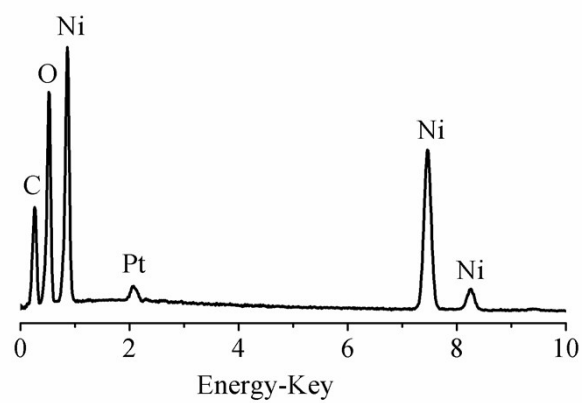
## Supporting Information: Figures



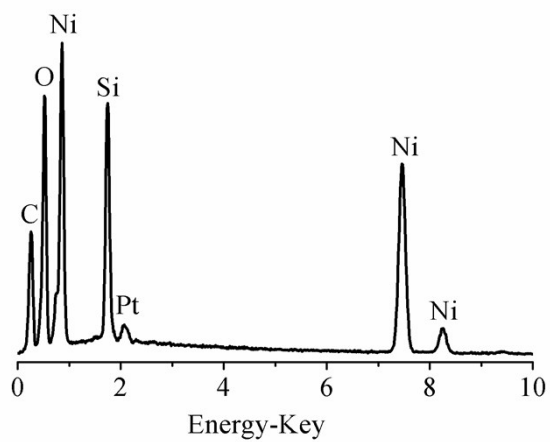
**Figure S1**, XRD pattern of the LNHS-Sal precursor.



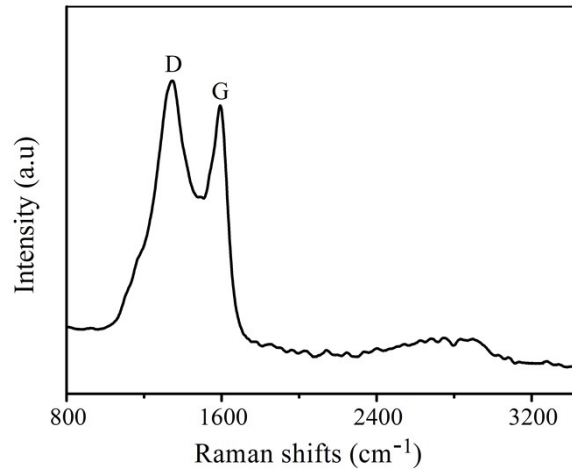
**Figure S2**, SEM image of the LNHS-Sal precursor.



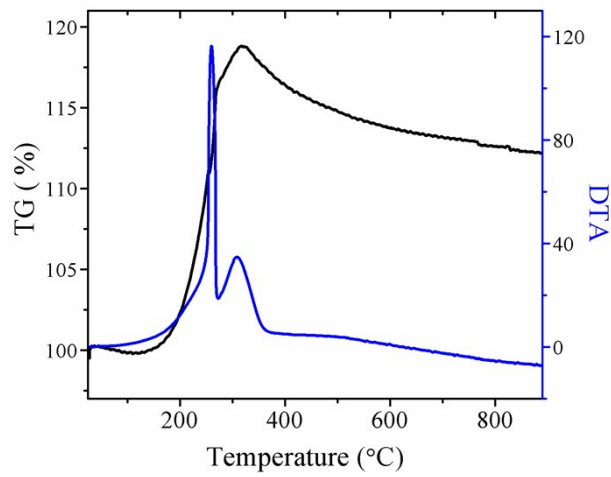
**Figure S3**, EDX pattern of the LNHS-Sal precursor.



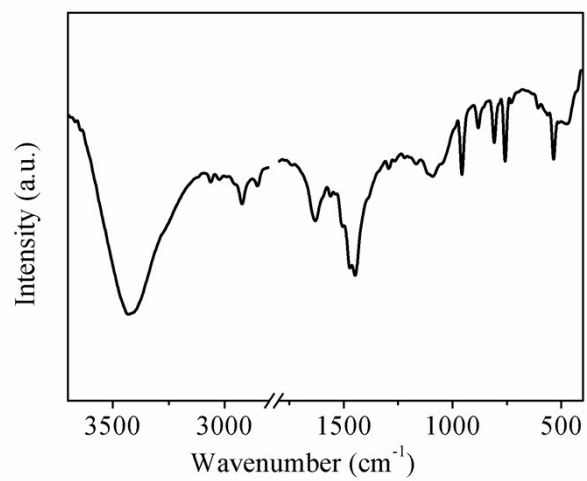
**Figure S4**, EDX pattern of Ni@C nanocomposites.



**Figure S5**, Raman spectra of the Ni@C nanocomposites.



**Figure S6**, TG-DTA curves of the Ni@C nanocomposites in air.



**Figure S7**, FTIR spectra of Ni@C nanocomposites.