Electronic Supplementary Material (ESI) for Nanoscale.

In situ assembly of well-dispersed Ni nanoparticles on silica nanotubes and excellent catalytic activity in 4-nitrophenol reduction

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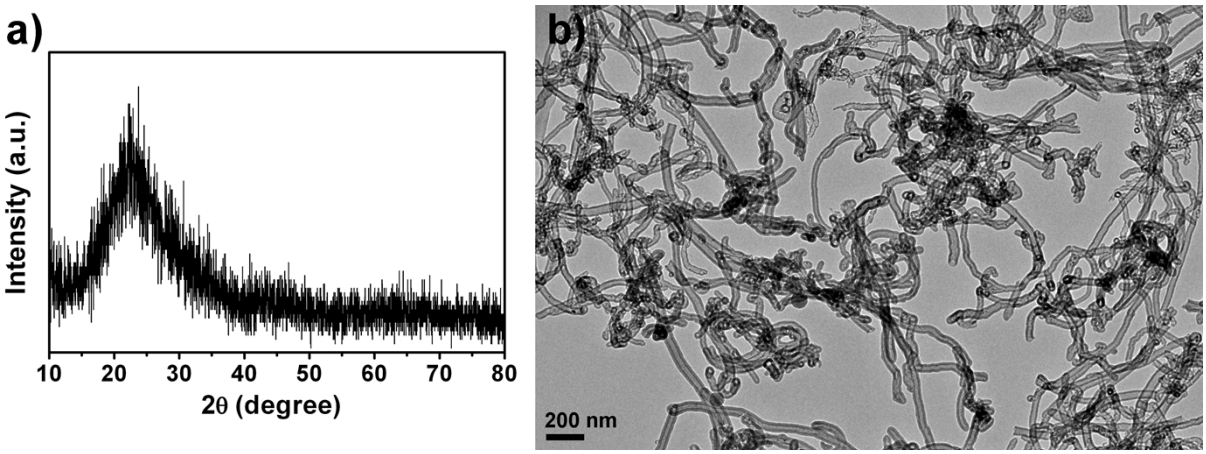

Fig. S1 XRD pattern and TEM image of SNTs after calcination at 800 °C for 8 h.

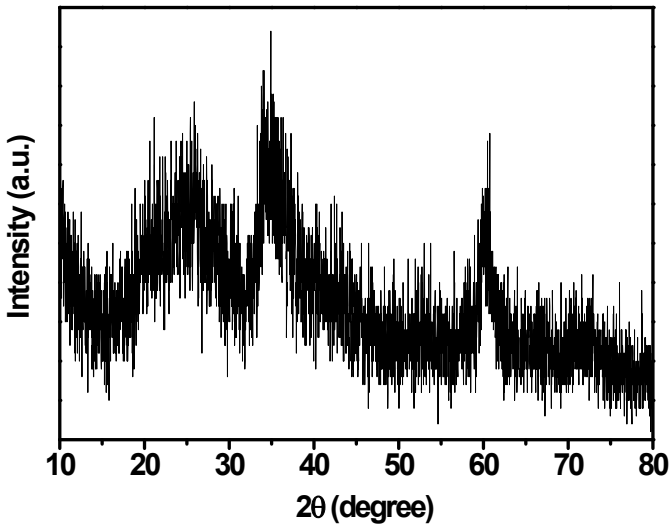

Fig. S2 XRD pattern of NiSNTs.

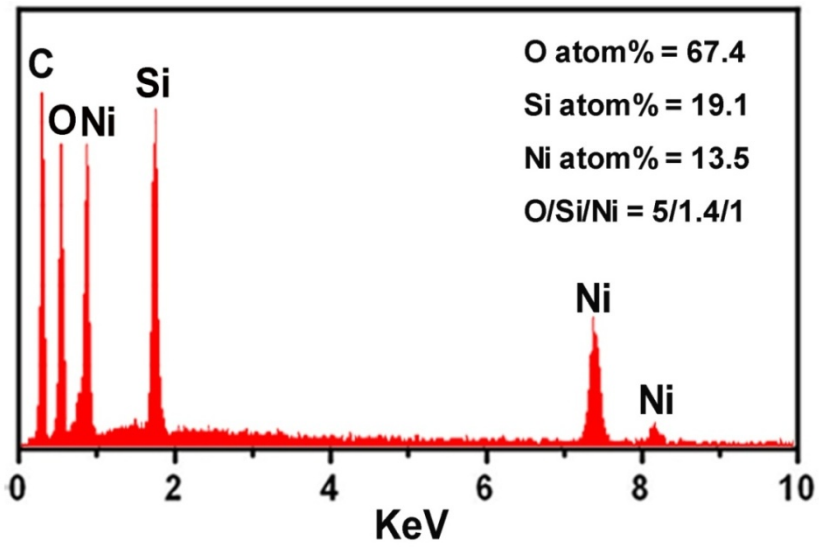

Fig. S3 EDS spectrum of NiSNTs.

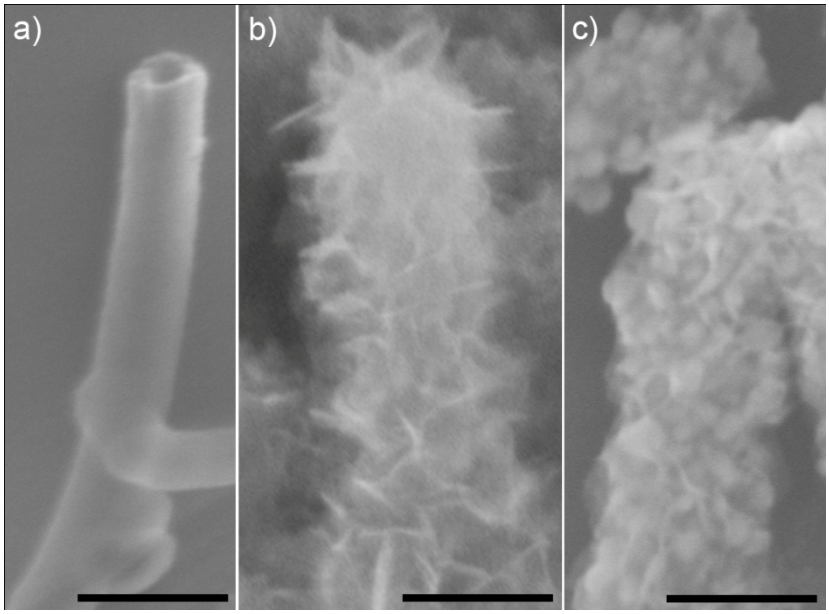

Fig. S4 SEM images of a single SNT (a), NiSNTs (b) and Ni/SNTs (c). The scale bar is 100 nm.

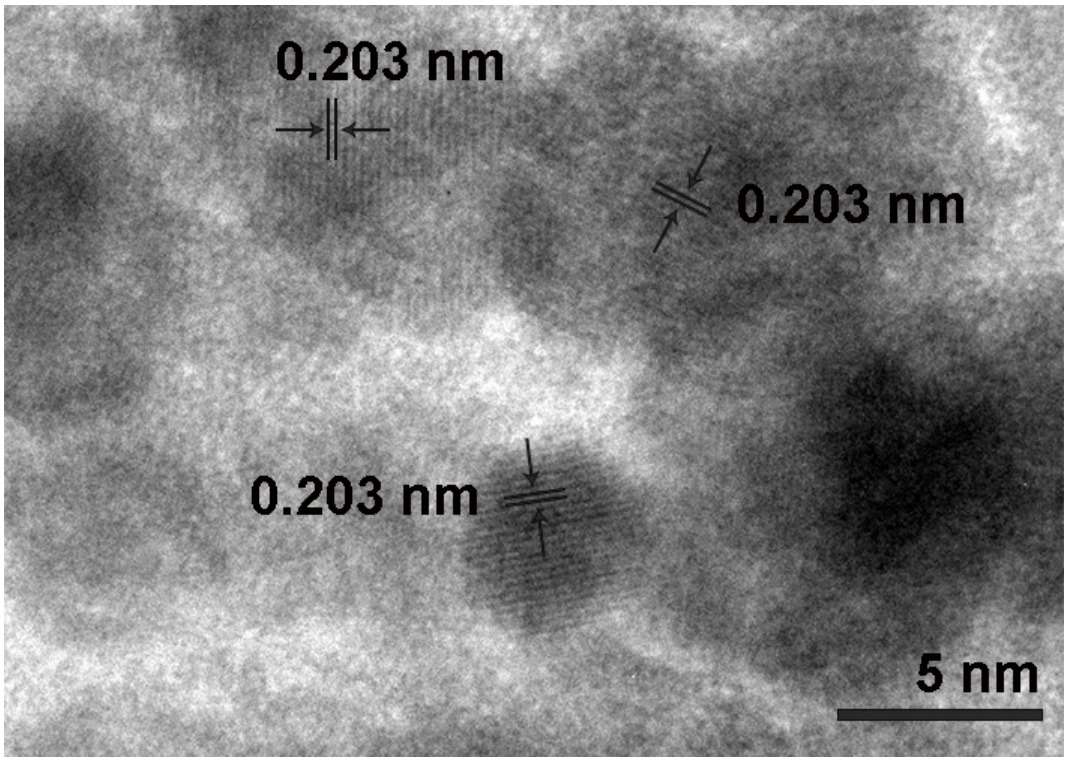

Fig. S5 Enlarged HRTEM of Ni/SNTs.

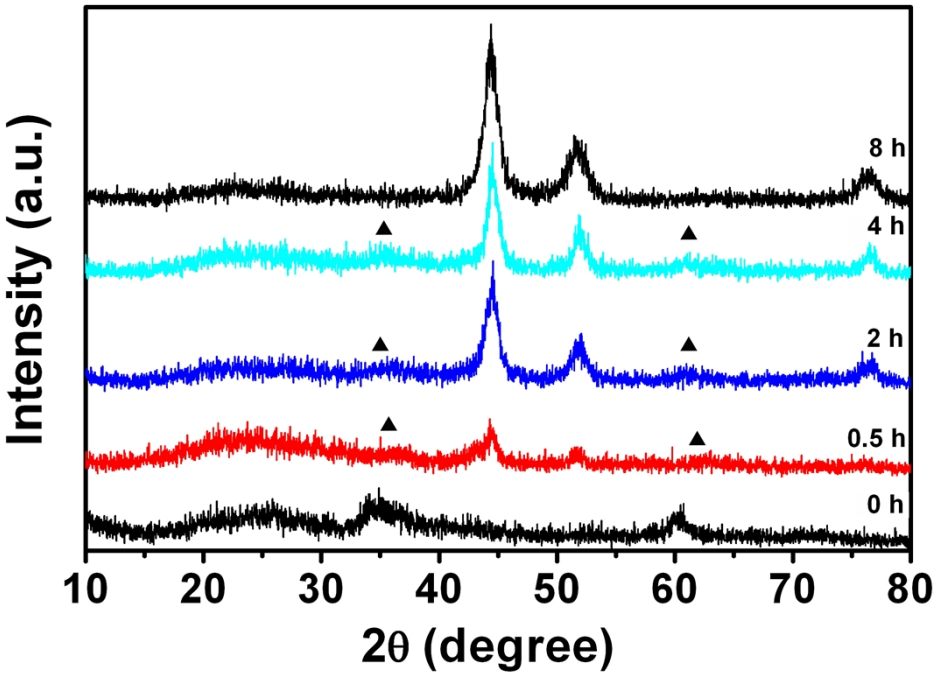

Fig. S6 XRD patterns of Ni/SNTs synthesized at 800 °C for different reaction time.

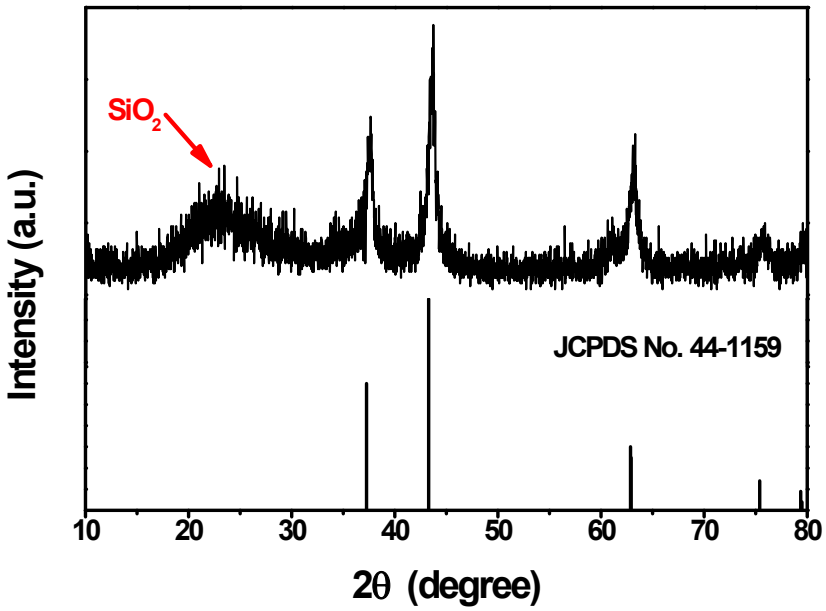

Fig. S7 XRD pattern of NiO/SNTs and the standard data of rhombohedral phased NiO.

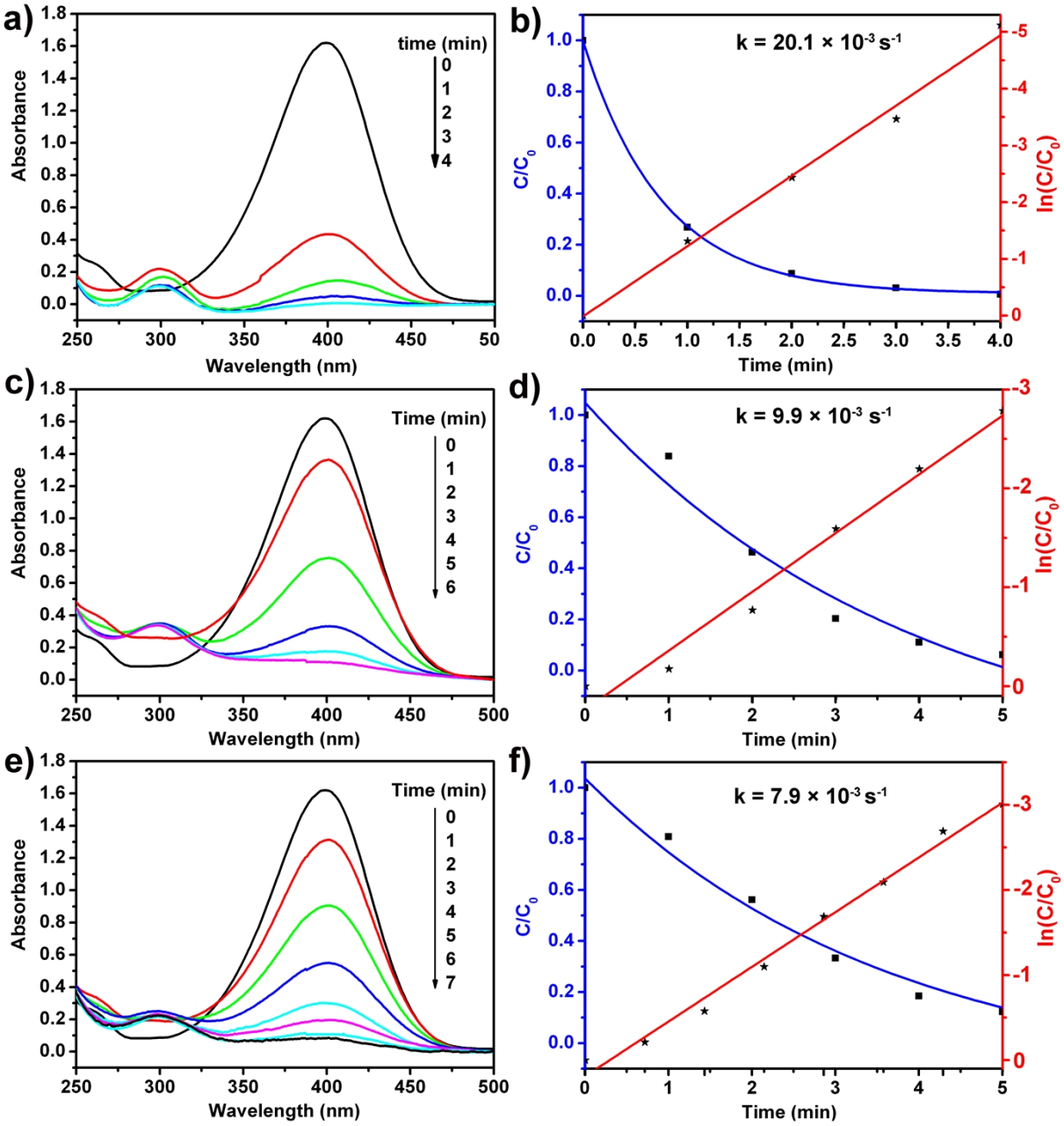

Fig. S8 UV-vis spectra of the catalytic reduction of 4-NP to 4-AP developed at different reaction times over Ni/SNTs catalysts synthesized by adding 0.5 mmol (a), 0.25 mmol (c), 0.1 mmol (e). C/C_0 and $\ln(C/C_0)$ versus time for the reduction of 4-NP over Ni/SNTs catalysts synthesized by adding 0.5 mmol (b), 0.25 mmol (d), 0.1 mmol (f)., the ratio of 4-NP concentration (Ct at time t) to its initial value C_0 is directly represented by the relative intensity of the respective absorption peak at 400 nm.

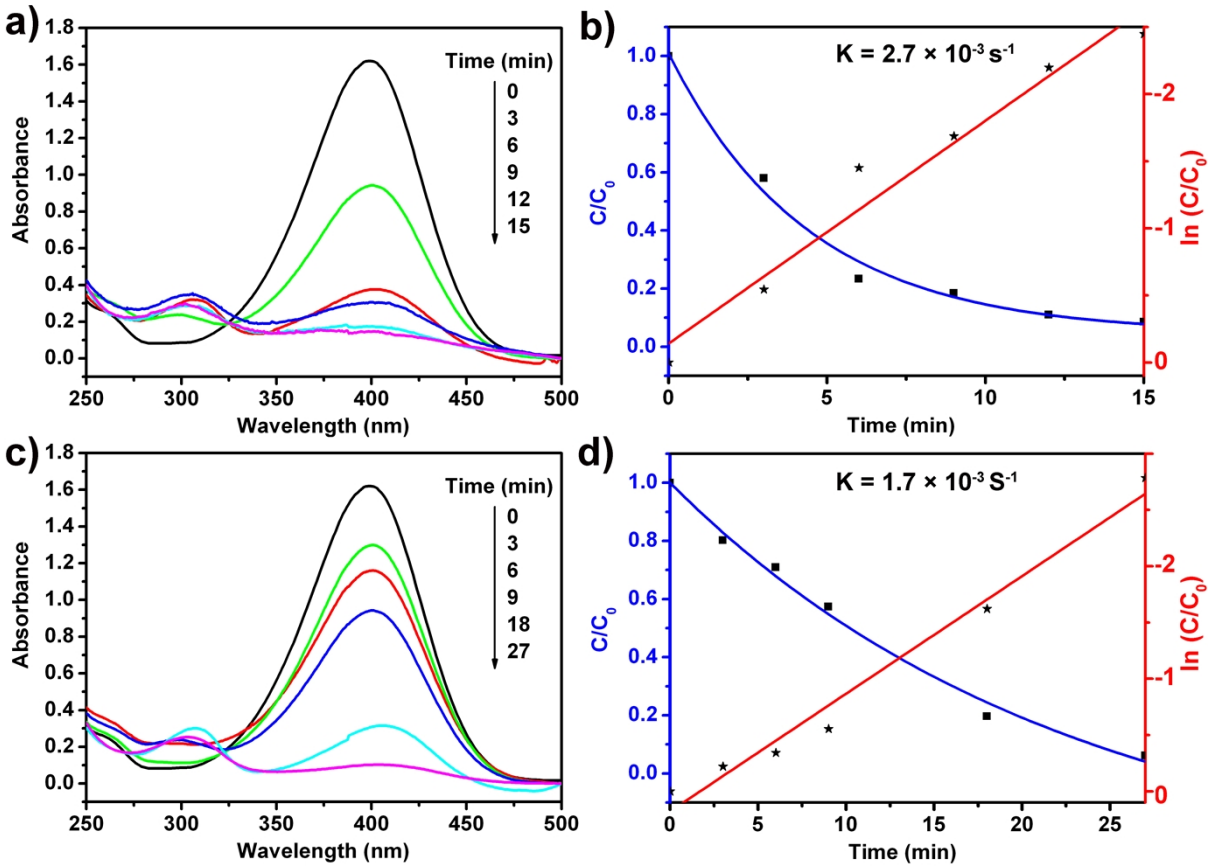

Fig. S9 UV-vis spectra of the catalytic reduction of 4-NP to 4-AP developed at different reaction times over Ni/SNTs catalysts synthesized by wet impregnation (a) and Ni/CNTs (c); C/C_0 and $\ln(C/C_0)$ versus time for the reduction of 4-NP over Ni/SNTs catalysts synthesized by wet impregnation (b) and Ni/CNTs (d), the ratio of 4-NP concentration (Ct at time t) to its initial value C_0 is directly represented by the relative intensity of the respective absorption peak at 400 nm.

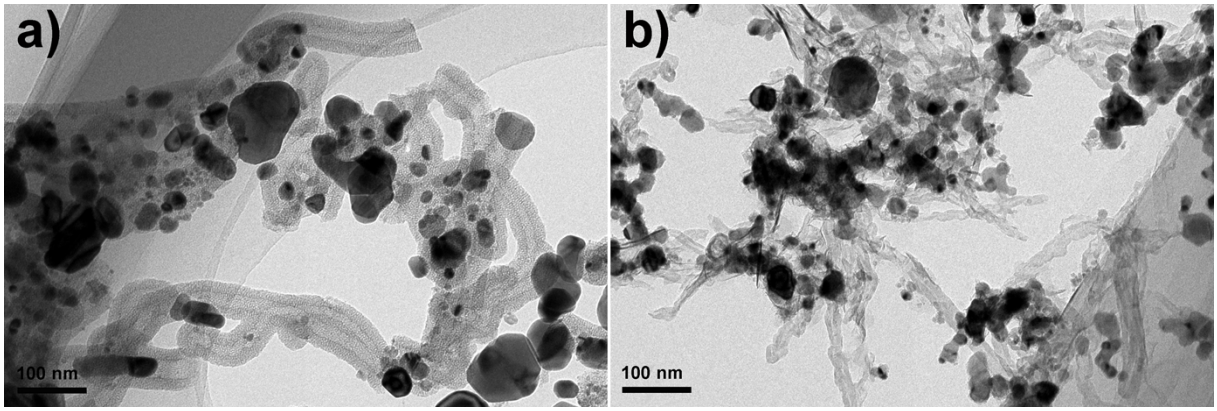

Fig. S10 TEM images of Ni/SNTs synthesized by the wet impregnation method (a) and Ni/CNTs (b).

Table S1 ICP data of Ni/SNTs synthesized by adding 0.1 mmol, 0.25 mmol, 0.5 mmol, 0.75 mmol $NiCl_2$ and Ni/SNTs synthesized by wet impregnation method and Ni/CNTs

Samples ($NiCl_2$)	Ni/SNTs (0.1 mmol)	Ni/SNTs (0.25 mmol)	Ni/SNTs (0.5 mmol)	Ni/SNTs (0.75 mmol)	Ni/SNTs (wet impregnation)	Ni/CNTs
Ni (Wt. %)	5.6	8.1	15.2	23.0	26.2	25.3

Table S2 BET surface area, average pore diameter and total volume of Ni/SNTs synthesized by adding 0.1 mmol, 0.25 mmol, 0.5 mmol, 0.75 mmol $NiCl_2$ and Ni/SNTs synthesized by wet impregnation method

Samples ($NiCl_2$)	S_{BET} (m^2/g)	D (nm)	V_P (cm^3/g)
Ni/SNTs (0.1 mmol)	123	11.2	0.34
Ni/SNTs (0.25 mmol)	193	14.7	0.66
Ni/SNTs (0.5 mmol)	201	19.6	0.86
Ni/SNTs (0.75 mmol)	416	9.42	0.89
Ni/SNTs (wet impregnation)	142	6.7	0.18

*S_{BET}, the BET specific surface area calculated in the relative pressures range from 0.05 to 0.2; D, the average diameter of mesopores calculated by the BJH method; V_p, the total pore volume calculated at the relative pressure of about 0.95.