Supporting Information

Ni/NiO nanocomposites with rich oxygen vacancies as high-performance catalyst for nitrophenol hydrogenation

Jun Zhou [1], Yue Zhang [1], Song Li [1,*] and Jing Chen [2,*]

[1] Key Lab for Anisotropy and Texture of Materials (MoE), School of Materials Science and Engineering, Northeastern University, Shenyang 110819, China; hafouniu@163.com (J.Z.); zhangyue@stumail.neu.edu.cn (Y.Z.)

[2] Institute of Microscale Optoelectronics (IMO), Shenzhen University, Shenzhen 518060, China

* Correspondence: lis@atm.neu.edu.cn (S.L.); jingchen@szu.edu.cn (J.C.)

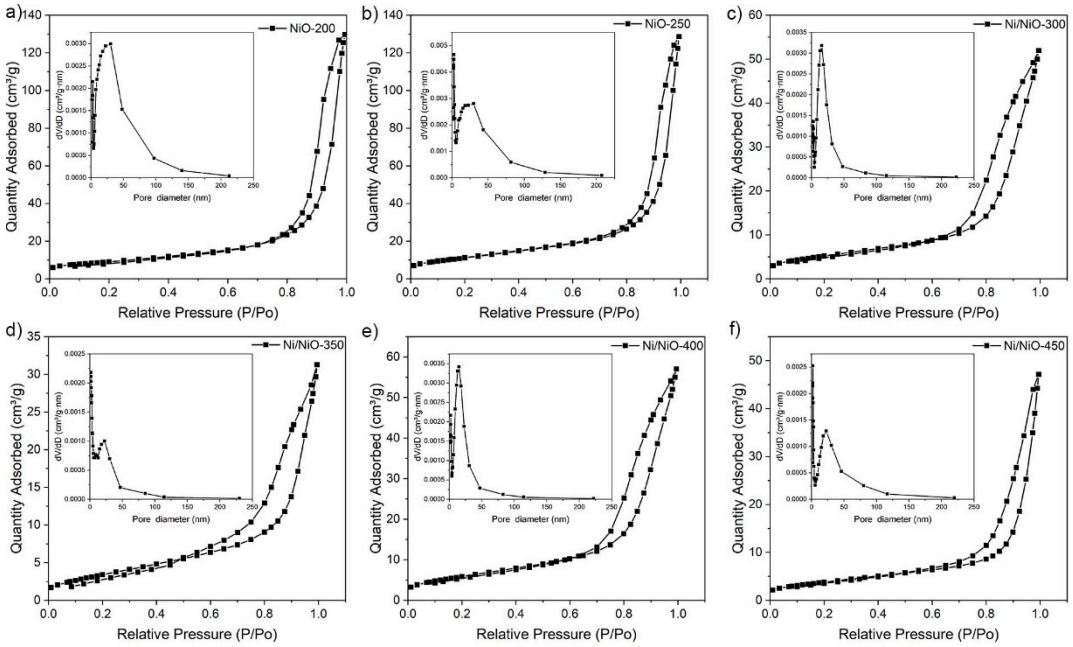

Figure S1. N_2 adsorption-desorption isotherms and pore size distributions calculated from the desorption branch of the samples (a) NiO-200, (b) NiO-250, (c) Ni/NiO-300, (d) Ni/NiO-350, (e) Ni/NiO-400, (f) Ni/NiO-450.

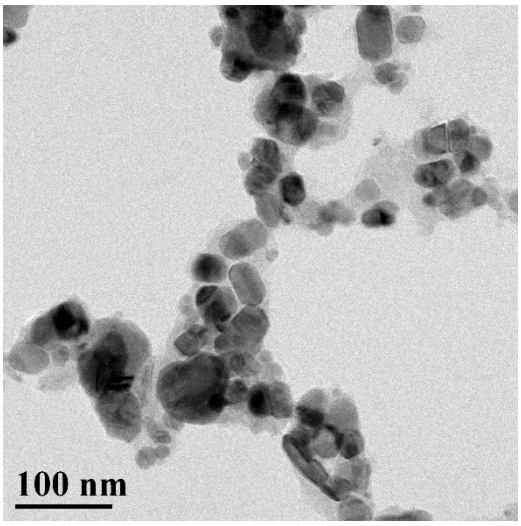

Figure S2. TEM image of the Ni/NiO after reduction at 350°C.

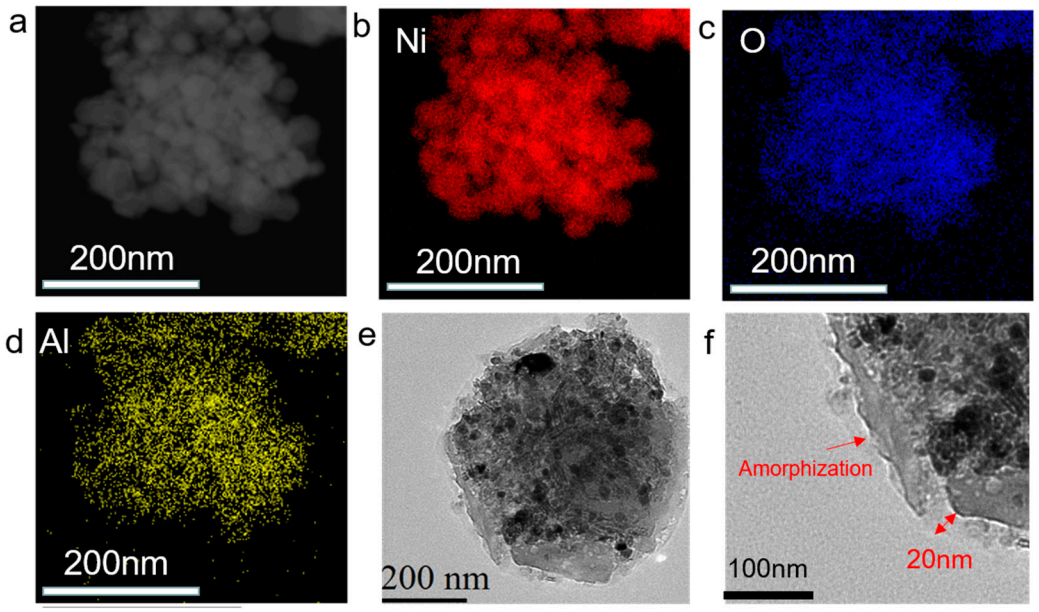

Figure S3. EDS mapping (a-d) and TEM images (e,f) of the Ni/NiO-350 sample, showing the damaged surface of Ni/NiO-350 due to presence of excessive O-vacancies. This indicates that the O-vacancies are mainly located on the outermost surface of Ni/NiO-350 sample (near below 20 nm).

Table S1. Textural properties of the Ni/NiO nanocomposites.

Samples	Surface area (m^2 g^{-1})	Pore volume (cm^3 g^{-1})	pore diameter (nm)
Ni/NiO-200	32.02	0.20	24.38
Ni/NiO-250	40.39	0.19	18.96
Ni/NiO-300	19.22	0.08	16.15
Ni/NiO-350	13.41	0.05	13.69
Ni/NiO-400	22.24	0.09	15.35
Ni/NiO-450	14.26	0.07	19.31

Table S2. Summary of constants and normalized rate constants for Ni/NiO nanocomposites.

Samples	Rate constant (min^{-1})	Normalized rate constant (metal-g^{-1}·min^{-1})
Ni/NiO-250	0.004	0.87
Ni/NiO-300	0.149	29.89
Ni/NiO-350	0.958	191.65
Ni/NiO-400	0.410	82.00
Ni/NiO-450	0.440	87.91

$NaBH_4$ and p-nitrophenol were 5.39 mmol and 0.05 mmol, respectively.
The reaction temperature was 25°C.