Electronic Supplementary Information

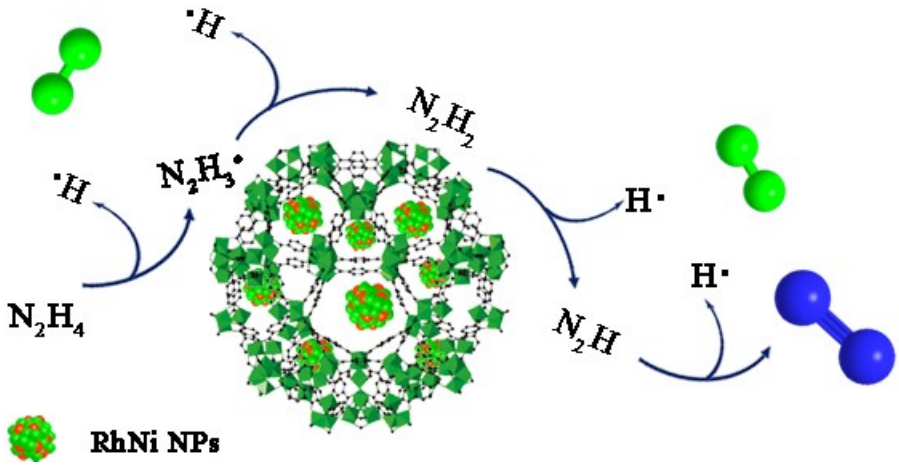
Nanoscale MIL-101 supported RhNi nanoparticles: an efficient catalyst for hydrogen generation from hydrous hydrazine

Pingping Zhao,[a] Nan Cao,[a] Wei Luo,*[ab] and Gongzhen Cheng[a]

[a] College of Chemistry and Molecular Sciences, Wuhan University, Wuhan, Hubei 430072, P. R. China. Tel.: +86 2768752366. *E-mail address*: wluo@whu.edu.cn.
[b] Suzhou Institute of Wuhan University, Suzhou, Jiangsu, 215123, P. R. China.
* Corresponding author: wluo@whu.edu.cn.

Table S1. Characteristics of MOFs with different dimensions and $Rh_{58}Ni_{42}$@MIL-101.

Sample	wt%	Surface Area (m^2 g^{-1})	Pore volume (m^3 g^{-1})	Pore size (nm)
MIL-101-50 nm		3913.2	2.135	3.183
MIL-101-100 nm		3420.8	1.869	3.176
MIL-101-200 nm		2232.8	1.195	2.995
$Rh_{58}Ni_{42}$@MIL-101	7.46	1538.2	0.922	1.178



Scheme S1. The potential pathway of the catalytic mechanism.

Figure S1. Low-angle Powder X-ray diffraction patterns of MIL-101 with different dimensions: (a) 200 nm; (b) 100 nm; (c) 50 nm.

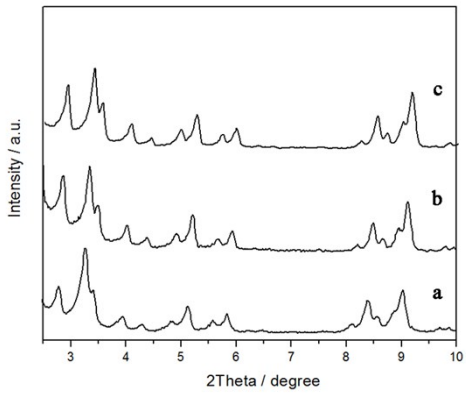


Figure S2. XPS spectra for catalyst $Rh_{58}Ni_{42}$@MIL-101 (a) survey spectrum and (b) Cr^{2p}.

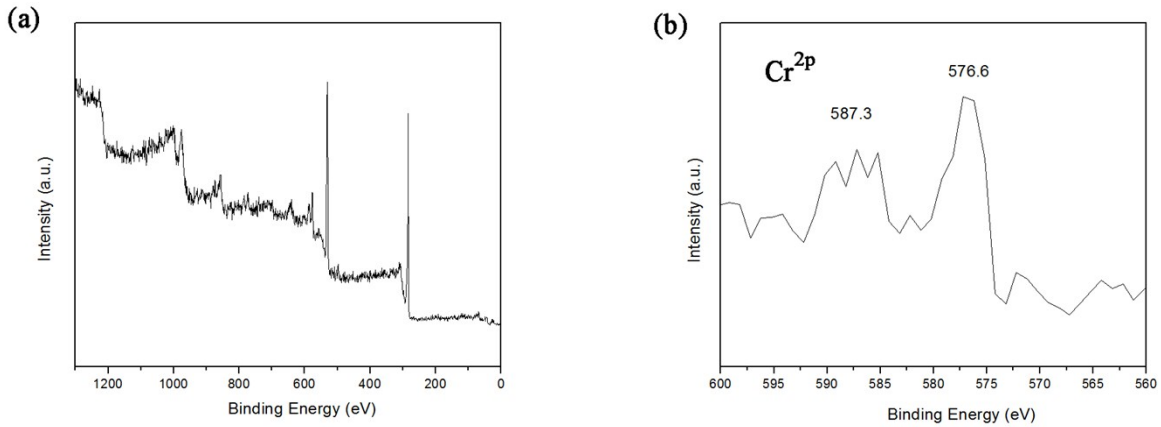


Figure S3. Magnetic effect test of the as-synthesized $Rh_{58}Ni_{42}$@MIL-101 catalyst.

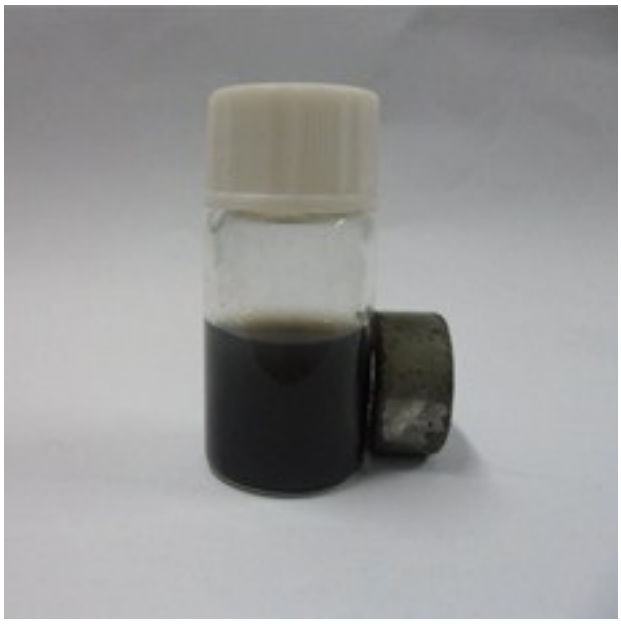


Figure S4. MS profile for the gases released from the decomposition reaction of hydrous hydrazine in aqueous NaOH solution (0.5 M) over $Rh_{58}Ni_{42}$@MIL-101 (catalyst = 0.100 g; $N_2H_4 \cdot H_2O$ = 0.1 mL) at 50 °C.

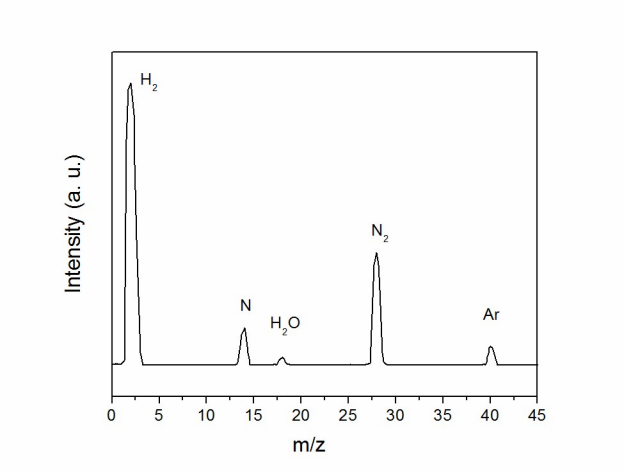


Figure S5. MS profile for the gases released from the decomposition reaction of hydrous hydrazine in aqueous NaOH solution (0.5 M) over RhNi/C (catalyst = 0.100 g; $N_2H_4 \cdot H_2O$ = 0.1 mL) at 50 °C.

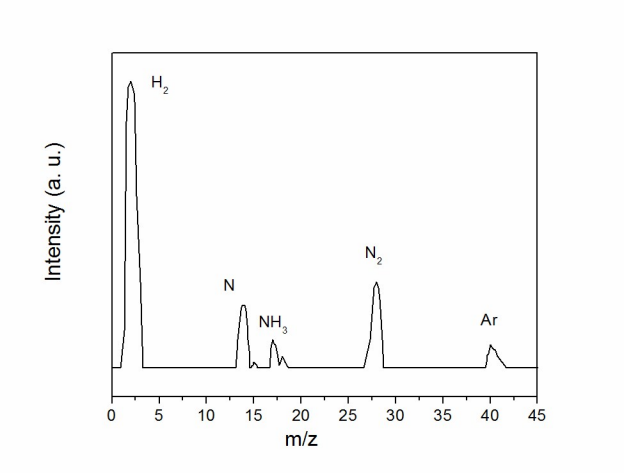


Figure S6. TEM of RhNi NPs with different dimensions.

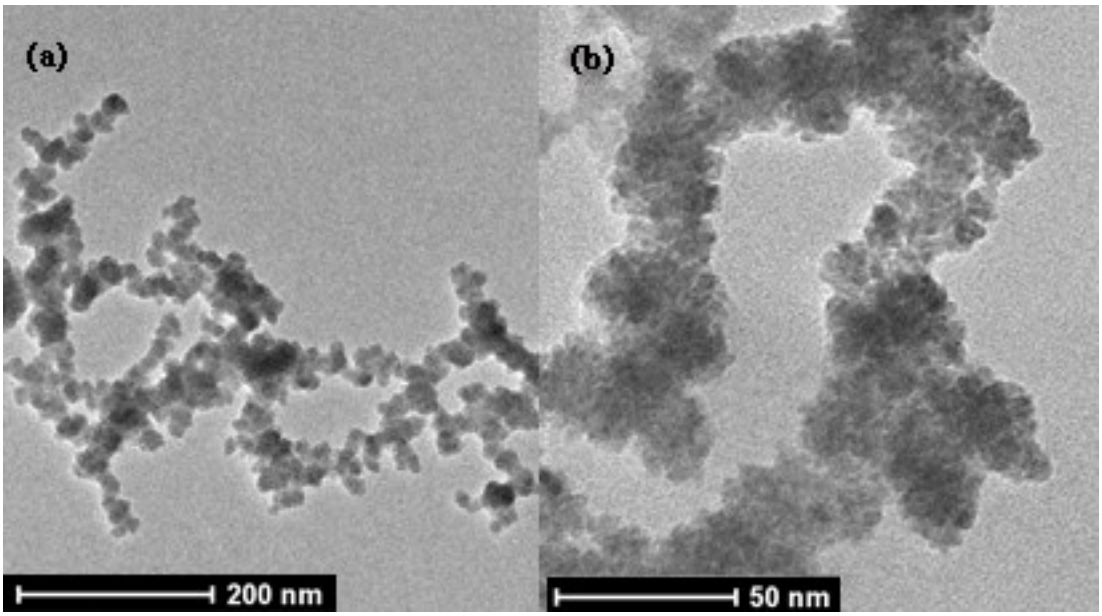


Figure S7. $Rh_{58}Ni_{42}$@MIL-101 catalyst after the canalization reaction of 5 runs toward the decomposition of hydrous hydrazine: (a) SEM; (b) TEM; (c) N2 sorption isotherms; (d) low-angle powder X-ray diffraction pattern.